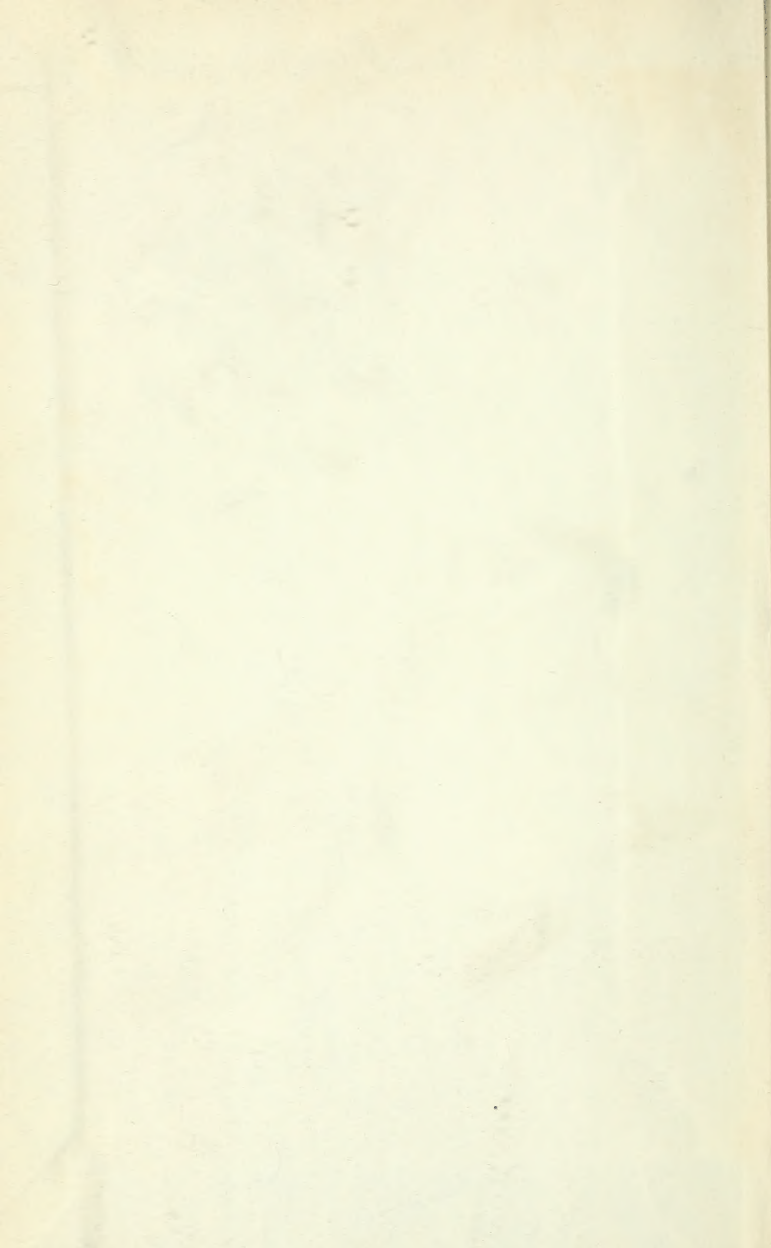


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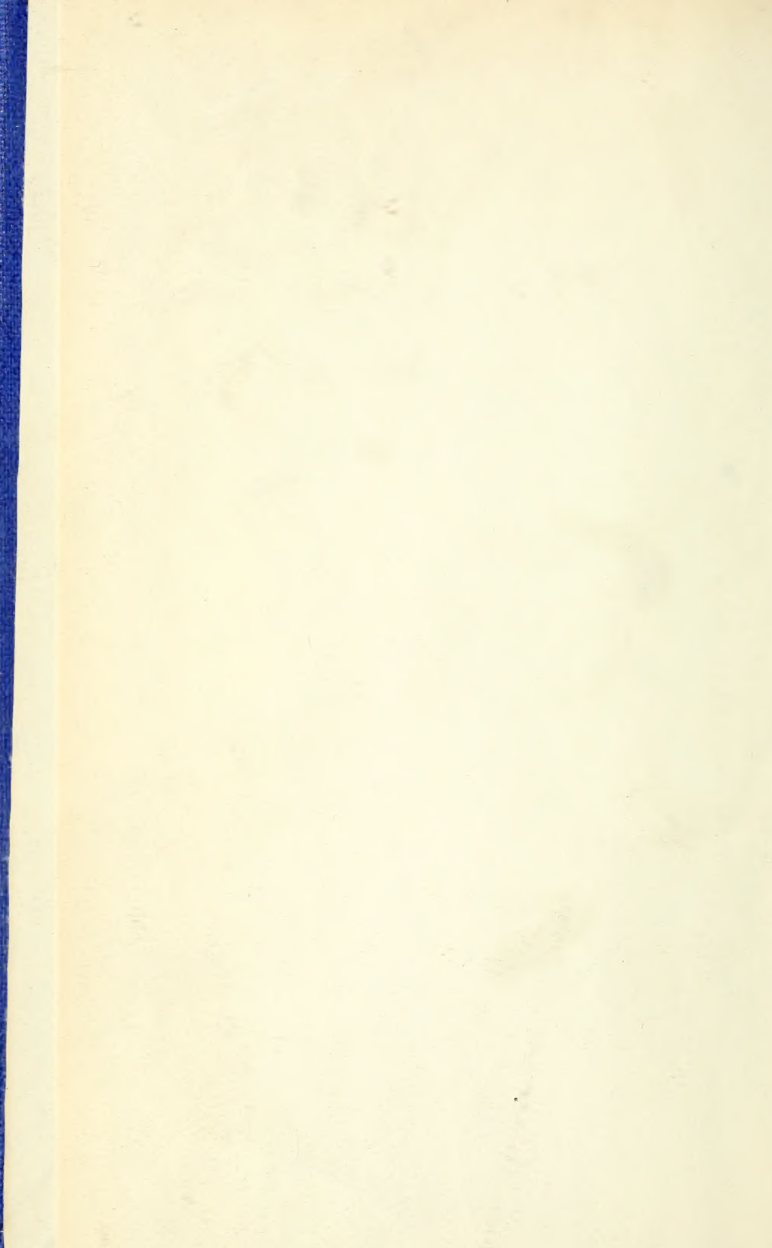
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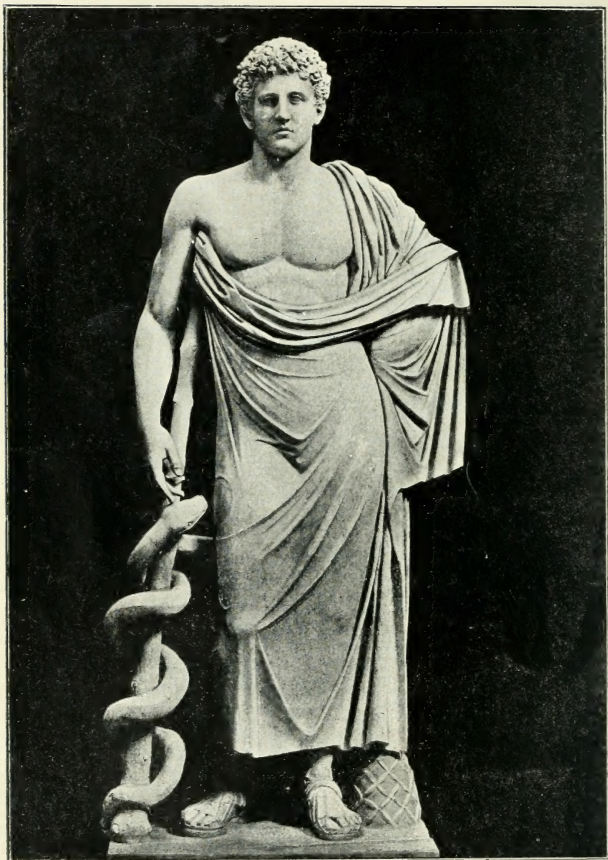




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ÆSCULAPIUS.

From the Statue in the Vatican at Rome.

Frontispiece, Vol. II.]

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DISCIPLES OF ÆSCULAPIUS

By SIR BENJAMIN WARD

RICHARDSON, M.D., F.R.S.

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With a Life of the Author
by his Daughter . . .
MRS. GEORGE MARTIN

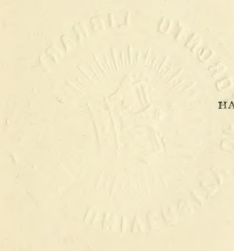
In Two Volumes
VOL. II.



WITH PORTRAITS AND ILLUSTRATIONS

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London: HUTCHINSON & CO
Paternoster Row ♀ ♀ 1900



PRINTED BY
HAZELL, WATSON, AND VINEY, LD.
LONDON AND AYLESBURY.

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Alexander Monro, M.D., F.R.S., and the Origin of the Edinburgh Medical School

IT is always instructive to turn to the medical school of the old University of Edinburgh, and to renew acquaintance with its great Professors. With this end in view I now select the first of the famous family of the Monros, for a long period of time the anatomical lights of the wonderful northern *Æsclepiæ* of these British Isles.

Our Alexander Monro was born of an historical family. His grandfather was one Sir Alexander Monro, a brave Royalist soldier, who, with a brother David, followed Prince Charles, afterwards Charles II., to Worcester, in the ill-starred campaign against the Parliamentary forces. In the fight brother David fell, and gave up his life for his cause; but Alexander escaped, and, waiting for the restoration of the king, saw his hopes gratified. Then, tired of the military life, he sought for new honours in the profession of the law. Admitted, in due course of time, to the Bar, he gained quick promotion, and became one of the principal clerks of the Court of Session.

Sir Alexander Monro had two sons, George, the elder, and John. George followed the profession of arms, and soon rose to the rank of major, after which he retired from the service, and went to reside at Auchinbowie, in the county of Stirling, where he possessed a country seat, and here he finished his days in peace and honour. John, the younger son of Sir Alexander, was brought up to medicine, and after completing the curriculum and qualification of the day in which he flourished, entered the army as a surgeon soldier, served in Flanders under King William the Third, and returned home to his wife, who was also his cousin, a niece of Mr. Forbes of Culloden, the scene of

the decisive battle of that name. That he was a man favoured by some powerful patronage is shown by the fact that he was permitted in the winter months to come to London for residence, and to reside there freed, as it would seem, from the performance of official duties. It was whilst in residence in London that the subject of this memoir, Alexander Monro, was born. The birth took place on the 8th day of September—Old Style—1687.

Three years after this important family event Dr. Monro gave up his position in the army, and taking up his permanent residence in Edinburgh set up, to use the old-fashioned language, as a practitioner of physic, and very soon gained a large practice and a wide reputation. It is reported of him that he was a man of great talent and of most engaging manners. For himself he sought, however, no signal distinction. His mind was turned to the cultivation and elevation of this son, his beloved child, who from the first gave promise of great things, and who was as good as his promise, to the entire felicity of his devoted parents. From the first this boy, Alexander, was destined to the profession of physic; all the energies of his mind were turned towards it, and the desire of his heart fed him with that attachment to the science and the art which is so essential to success.

PROFESSIONAL STUDIES.

His general education completed, the young Monro entered on his medical studies in Edinburgh, and passed successfully through them. He then was sent to London, and was placed under the tuition of three of the leading metropolitan lights of science, namely, Hawksbee, Whiston, and Cheselden. Hawksbee, remarkable as an electrician, was the discoverer of the mercurial phosphorus, and was the first man who constructed a glass globe, which he rendered partially vacuous, and then by applying his hand to it while it was in motion on its axis observed an electric light within the globe. He may, in fact, be looked on as the first philosophic discoverer of the electric light, and one of the first to make a distinction between positive and negative states of electricity.

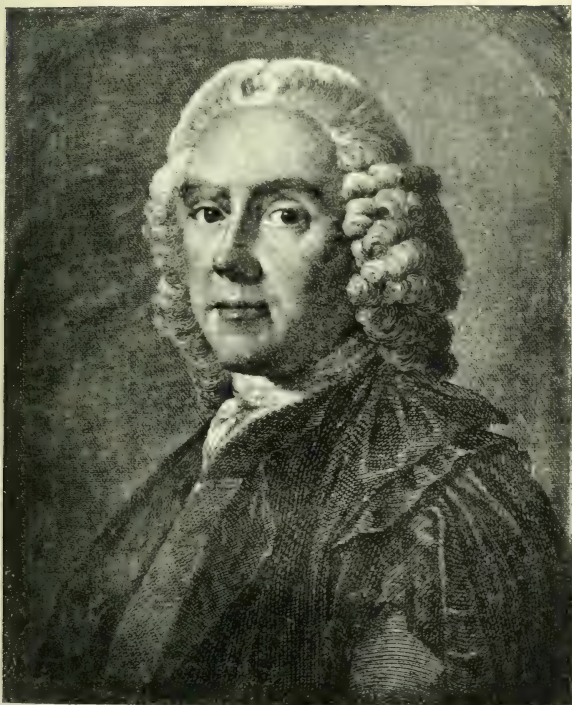
Whiston, whose works on subjects of natural philosophy remain good to the present day, and who in his own time was esteemed as one of the most accomplished of teachers, must have influenced the young student most favourably by charging his mind with lines of thought which would make him more than the mere student

of physic intent only on medical details; whilst under the truly distinguished Cheselden he would be grounded in anatomical and surgical knowledge and skill in a manner simply incomparable at the date in which he was an aspirant for medical and scientific fame. That Monro availed himself freely of these advantages, and from the first was ambitious to excel, is shown by the position he took amongst his compeers. There existed in London amongst those compeers a society for the cultivation of scientific medicine, the name and precise constitution of which is now lost, but which exercised, as it would seem, considerable service for good amongst those who took part in its labours. Monro joined this society, and read before it a paper on Anatomy, which formed afterwards the basis of his first anatomical essay. He also became a skilful and industrious dissector, and having made some dissections of more than ordinary excellency he packed them off to Edinburgh, in order that Pater Monro might see with admiring, and let us hope critical, eyes the practical advancement which his son had attained. Pater Monro was more than pleased; he was so delighted that he had the specimens laid before the Royal College of Physicians of his city for their admiring criticism, and, in time, had them mounted in a cabinet, and preserved in the museum at the Surgeons' Hall, where they remained, I have been told, for nearly a hundred years. The effect they had immediately was important enough to the sender. They led Mr. Adam Drummond, the professor and demonstrator to the college or hall of the Surgeons, to request Pater Monro to write to his son and invite him, if he continued to progress as he had begun, to return to Edinburgh, and take up his, Mr. Drummond's, chair.

The arrangement was precisely that which could most be wished for; but further study was thought to be desirable, and so our incipient professor soon set off on a journey to Paris to the famous School of Anatomy there. In Paris he attended the hospitals and the various courses of lectures pertaining to medicine and surgery, continuing his studies until the autumn of 1718, when he moved to Leyden in order to become one of the elect of the illustrious Boerhaave, the then commanding star of medical professors, and now in the full blaze of his glory. To Boerhaave he carried the best of all recommendations, a steady stream of patients, coming from Scotland to consult the master by the introduction of a pupil, who obtained all the good wishes of the master, and whose assiduity and perseverance were subjects of general admiration.

In the year 1719 Alexander Monro returned to Edinburgh full of life and vigour, a young man of greatest promise, a young man placed in a most favourable position in the social ranks of medicine in a famous old city; and, again, a young man who through the devotion of an earnest, devoted, and trusting father had received advantages which had probably never before befallen any aspirant for medical honours in the metropolis of the North. The stars in their courses favoured this youth. He was the man wanted to found a school in Edinburgh—a school which should be a fair rival of any other in the world, and of which Paris and Leyden themselves need not be ashamed. This was his destiny, and he played his part to perfection.

At the period named, 1719, there was no regular medical school in Edinburgh. In the Company of Surgeons of that city courses of lectures were delivered on anatomy, with demonstrations, by Drummond and Macgill, who acted as teachers, after the manner of the London anatomists. Macgill was a man of considerable mark, as may be inferred from the manner in which Cheselden was led to address him; in 1719 he and Drummond were the conjoint professors in the Anatomical School at the College or Company of Surgeons, and, by a fortunate chance for young Monro, they offered to resign their office in his favour. He thereupon became a member of the Company of Surgeons, and took upon himself the duties of the professorship which they vacated. Soon after this, at the instance of his father, he undertook also to deliver a public extra-academical course of anatomy. The older gentleman, perfectly confident in the ability of his Alexander to meet any difficulty, and to accomplish any task he might lay his hand to, invited, without the knowledge of his son, the President and Fellows of the College of Physicians and the whole of the Surgeons to attend and listen to the introductory lecture. It was a risky experiment, and was rendered still more risky than it otherwise might have been by the circumstance that the tyro Professor, who had prepared his lecture with the utmost care on paper, had left his manuscript at home. When, therefore, he entered the presence of so many grave and reverend seigneurs he stood lecture-struck, and unable to utter a word. By good fortune, if he had no paper notes before him from which to descant, he had plenty of notes from nature in the form of anatomical preparations; and, soon regaining his presence of mind, he began to use the natural notes freely. These had been prepared by himself, and had been brought



ALEXANDER MONRO, Sen., M.D., F.R.S.

From an engraving by James Basin, 1775, after a painting by Allan Ramsay.



by him from abroad ; they were a novelty to his audience, and they afforded him ample themes for the exercise of a power of verbal exposition which he did not before know that he possessed. The result was a decided success, bringing down the applause of the audience, and disclosing to him his power of teaching from simple demonstration, a plan he never afterwards departed from. From that time onwards he taught always from memory, and laid down the doctrine that a professor who thoroughly knows his subject will invariably find words in which to explain it to others without any necessity for referring to notes for guidance or assistance.

The public lectures thus commenced became popular, and were backed up by another course on Botany and Materia Medica, delivered by Professor Alston, M.D., who was in fact a Professor in the University. There had been a Chair of Botany established in the University for a long time before the period named, but the occupants of the chair appear to have carried out the duties of their office in a perfunctory manner altogether, so that, practically, the chair was a dead letter until Alston began to teach. It was a sort of beginning for medicine, however, in the University, and was so far encouraging as to lead the ever-active father of the new anatomist to propose to the physicians and surgeons of Edinburgh a plan which he had long had in his mind of organising a complete medical school in their city. As yet the facilities for such an enterprise were few ; there was no hospital in the place that would serve as a clinical school ; the University, very great as a seat of general culture for the youth of Scotland intended for the Church, the bar, the senate, or literature, had not favoured physic, and hitherto there had arisen no bright aspirant for medical professorial fame who could be looked up to as a light of medical learning, a light to be set on a hill to attract the wayfarers of medicine into an *Æsclepiæ* that should be to them a home of rest and of study of the choicest sort. But at last here was the prime chance. Here was a teacher, whose qualities none could deny, ready for the task of teaching not anatomy alone, but surgery as well as anatomy. Here, also, was another Professor, learned in botany, capable of teaching that fascinating branch of natural science, and of blending with it the practical part, arising out of it, of *Materia Medica*. Lastly, here was the man of organisation, the father of the anatomist, a man himself of note in physic, and a man of reputation and trust, ready to stir up the authorities to the belief that a complete school of medicine was wanted in Edinburgh, and that the University was the grand centre in which the school must be established.

The idea once started was taken up warmly, and what was but an idea soon became a reality. Alexander Monro was made first Professor of Anatomy ; Alston retained his professorship of Botany and Materia Medica, now a living class ; Professors Sinclair, Rutherford, Innes, and Plummer were elected into different chairs ; and Edinburgh had a Medical School of her own.

To complete the undertaking, to give practice to theory, a hospital was next demanded, and once again the organising powers of the elder Monro were called into play. By the efforts of this gentleman, backed by those of the Members of the Royal College of Physicians and the Board of Surgeons, a fund was raised for building an infirmary or hospital for the sick poor ; a house was taken as a temporary institution ; physicians and surgeons were attached to it ; medicines were furnished gratuitously by the surgeon apothecaries, and the nucleus was formed for the larger design which was to follow.

The design that followed was a hospital to contain no fewer than three hundred beds for the sick, and was planned partly by the new Professor of Anatomy, Alexander Monro, and partly by an eminent architect named Adams and the newly-appointed managers. The Crown granted a charter of incorporation with the power of nominating eleven managers, with the addition of the Professor of Anatomy, who was to be a manager by virtue of his office ; and soon afterwards a building committee was formed, consisting of this Professor and George Drummond, Esq., who had several times served as Lord Provost. Under their able superintendence the work went on rapidly to its completion.

It is related in Hamilton Moore's collection of *Voyages and Travels*, and quoted by Dr. Donald Monro, the second son of the Professor, who lived and practised as a physician in London, and to whom I am indebted for the details of much of this memoir, that the new infirmary was erected by the inhabitants with great spirit and unanimity. The proprietors of many stone quarries made presents of stone, others of lime ; merchants contributed timber ; carpenters and masons were not wanting in their contributions ; the neighbouring farmers agreed to carry the materials gratis ; the journeymen masons contributed their labours for a certain quantity of hewn stones ; and as the undertaking was for the relief of the diseased, maimed, and lame poor, even the day labourers would not be exempted, but agreed to work one day in the month gratis towards the erection of the building. The ladies also assisted in their way :

they appointed an assembly for the benefit of the work, which was well attended, and every one contributed bountifully.

It is difficult to find in the whole history of philanthropic effort anything more remarkable than this sympathetic outburst of energy by the whole of a community. It is a beautiful picture of universal devotion to a great work, and had it been connected with the defence of the city from visible and mortal foes, armed *cap-à-pie*, and lying before the walls of the place, it would have gone down to history as an episode fitted splendidly for the painter, the poet, the player, the historian, and the novelist. Yet it was, in point of fact, a finer and, on the whole, nobler work than any one of war or siege. It was a work of love and of loving sacrifice for all men and for all time. A man might be proud indeed to be even a day labourer in such an effort, and proud beyond measure he would have been if he could have foreseen the grand result that was to come out of his labour. The mighty medical school of Edinburgh, second to none in regard to results, lay, *in minimo*, in that man's hand. Those walls which the masons quarried for, and the building masons and carpenters erected, what genius were they not to enclose, what practical talent to send forth to the ends of the earth ! But I shall be led away if I let my admiration run, as it wishes, into the history of the medical school of Edinburgh, so I return to the first professor, Alexander Monro.

In 1721 Monro was formally inducted into the Chair of Anatomy, and in 1725 he was formally inducted into the University. In this same year, 1725, he married Isabella Macdonald, daughter of Sir Donald Macdonald, of Macdonald, in the Isle of Skye, Baronet, by whom he had eight children. Four of these died in infancy, and four survived him : namely, John, who became an advocate ; Donald, Physician to the army, and afterwards Physician to St. George's Hospital, London ; Alexander, who succeeded him as Professor (commonly known as Monro Secundus) ; and one daughter, who married James Philp, Judge of the Court of Admiralty for Scotland.

The lectures of the new Professor included surgery, with anatomy, during the winter session, from November to May, and in addition he gave what we in these days should call clinical lectures in surgery. Dr. Rutherford, after 1748, gave similar lectures in medicine.

From what we have now seen of the life of Professor Monro, we may justly claim for him that he laid the foundation-stone of the school of medicine of Edinburgh. It is not going too far to say that,

really, he laid the foundation stone of true scientific and methodical teaching of medicine in this country altogether. There had been great teachers of medicine before his time, and teachers, like William Harvey, who were far more original than he. Yet, as a systematic expounder, he stands first. To use a common expression, he founded a method, and, in regard to anatomy, a method which has been followed into our own time. What his teaching was like Dr. Donald Monro recites in careful detail, well worthy of being repeated in form of abstract, as a study even for living teachers to bear in mind.

His lectures were on Anatomy and Surgery, and they lasted each year from the month of October until the following May. He began with the history of Anatomy, giving a regular account of the most remarkable anatomists from the earliest times up to his own time, mentioning their different improvements and discoveries, the dates of the times in which they were made, and the different claims of authors to the honour of particular discoveries. The minds of his pupils thus prepared, he proceeded to the study of Osteology, beginning with the bones in general, then passing to each particular bone, demonstrating its parts, structure, uses, and the diseases to which it is liable. From the study of the skeleton he moved to the muscles, the abdominal and thoracic viscera, the brain, the nerves, the blood-vessels, taking the anatomy first of each part, and next the structure and diseases of each part. He illustrated the anatomy of the human body comparatively by the dissection of different animals—quadrupeds, fowls, and fishes. He considered particularly the diseases for which surgical operations were commonly undertaken, and showed his pupils, on the dead subject, the best methods of performing the different operations, with the advantages and disadvantages of each method. He showed, also, the different bandages and other appliances and instruments used in surgery, and the circumstances in which they were useful. Finally, he wound up his winter course with some general lectures on the subject of Physiology.

We wonder in this day of many lectures and many lecturers how one man, whatever his ability, could carry on such a wide field of teaching as is here presented to view. To-day probably ten teachers would be employed to take up all that Monro embraced in one course. But at that day teaching on the subjects named was a young art; few men were ready to teach anything; and one man who could teach all fairly was sure to draw, as Monro did, students from every portion of the kingdom. Whether the plan was not, after all, the

best is still a moot point. We have had in our time teachers called, disrespectfully and vulgarly, "grinders," who, possessing the true art of teaching, have supplemented successfully the feeble arts of the many, and, like Monro, have taught better than all the rest. Nor is this wonderful, for be it observed that the subjects included in his demonstrations lie all together, are all part and parcel of one great whole, and are so indivisible that to break them up into many sections of an arbitrary kind, each section in the hands of separate teachers of different powers, is less open to success than to entrust them, in their simple unity, to one truly great teacher who understands the detail and the unity with equal precision and breadth of knowledge.

The day most certainly will return when unity of teaching will become once more the order of the Academy and University. A new school will rise to which all students will flow, as they originally did to the first Monro, and which will be the grand medical school over again.

Monro laboured as professor for nearly forty years ; but when we say he laboured, we need not mean anything extravagant, for with him labour was love of usefulness. Turn to his portrait, and read in the face the sweetness and splendour of the satisfied mind and heart. Not a dot of envy, not a line of jealousy, is depicted there. A child in my library picks up the portrait as it lies on a side table, and brings it to me with the question—"Oo is the booful gempiman?" then, being told that he was a wonderful doctor who lived many many years ago, kisses the picture, and restores it with the brightest of smiles to its place.

Monro resigned the anatomical chair to his son, afterwards known as Monro Secundus, who in some points of view was superior to his father—that is to say, was a man of greater originality, and a more advanced and perhaps a more accomplished writer. On resigning his chair to this able successor he did not, however, resign work. He began to deliver clinical lectures in medicine at the new hospital, on which lectures Dr. Duncan, one of his pupils, reported that "it is hardly possible to conceive a physician more attentive to practice, or a preceptor more anxious to communicate instructions. In the different stations of physician,"—for he had by this time been made one of the physicians—"of lecturer, and of manager to the hospital, he took every measure for inquiring into the cause of death by dissection. He personally attended the opening of every dead body ; and he not only dictated to the students an accurate report of

the dissection, but with nice discrimination contrasted the diseased and sound state of every organ."

MONRO PRIMUS AS AN AUTHOR.

The writings of this representative of the Monro family are usually called the writings of Monro Primus, in order to distinguish them from those of the second of the name who succeeded him, and who was also named Alexander. They were collected by Monro Secundus in one volume, and were published, with copper-plates, with a life of the author by Dr. Donald Monro already referred to, and with a portrait, an autotype of which is published as the frontispiece of this biography. The works include fifty-five essays, and take a very wide range; and yet they are clearly the results of one particular line of thought, expressing unity of thought in every page.

The first essay is on the art of injecting the bodies of animals, an art which Ruysch had brought to extraordinary perfection. Monro carried the art to a great refinement in the process of injecting the minute blood-vessels and the delicate membranous surfaces. He gave up spirituous solutions for this purpose, because he had observed that spirit, by which he meant spirit of wine, caused coagulation, and by his method he employed two processes. In order to inject the finest vessels, he threw in first, by the syringe, coloured oil of turpentine, and immediately afterwards pushed on a common coarse injection, which readily incorporated with the finer fluid so perfectly that when the injection was well done the sharpest eye could not discover that two sorts of injecting fluid had been made use of. It was, I suspect, by this method Dr. William Hunter succeeded so admirably in his specimens, and it is a bit of practical information that is well worthy of being remembered and acted upon even at the present day.

A most practical chapter on the method of preparing and preserving the parts of animal bodies for anatomical uses is also supplied. For preserving such soft structures as the brain, Monro immersed the parts in a solution of refined spirit and acid, in the proportion of two drachms of spirit of nitre (nitric acid) in one pound of ardent spirit, strong alcohol.

A series of essays follow, relating to osteology and to the skeleton, all full of interest, and deserving careful study. They are succeeded by a memoir on the nerves, including an argument on the still unsolved question of the cause of muscular contraction under

nervous influence. This essay, however, gives way in interest to another on the nutrition of foetuses, in which the point is discussed whether the foetus is nourished entirely through the umbilical cord, or whether it receives nourishment also from the amniotic fluid, by the mouth. The inference drawn is that the nutrition is by the umbilical cord, an inference sustained by a line of arguments derived from a variety of sources, and indicating not only an extended reading of natural phenomena, but a long and candid study of other men's observations as well as his own.

I pass over several other papers, including one on cases of "tumefied ovarium," a clear and excellent chapter on the duodenum, and a series of brief communications, in order to come to a report as curious to us in this day as it was in the time it was written—namely, *An Account of the Inoculation of Small-pox in Scotland, made To the Most Worthy Dean and Learned Delegates of the Faculty of Medicine in Paris, appointed to inquire into the Advantages and Disadvantages from Inoculation of the Small-pox*. In this account the author essayed to answer the following questions: (1) Has inoculation been practised in your country, and with what success? (2) Did some of the inoculated die? (3) Did some who had undergone inoculation take the natural small-pox afterwards, and at what time? (4) Do you know that other diseases have been ingrafted with the small-pox by inoculation? (5) Whether did many after inoculation labour under various diseases which seemed to be owing to the operation, and whether did this happen more frequently or seldomer than from the natural small-pox?

Monro's answers to these inquiries are most valuable. On the first question he tells us, that long before the communication of small-pox by inoculation, communication of it by contact was carried out, and that parents whose children had not had the small-pox would watch for an opportunity of any child of their neighbours being in good mild small-pox, that they might communicate the disease to their own children by making them bed-fellows to those that had it, and by tying worsted threads, wet with the pocky matter, round their wrists. He next informs us that the practice of inoculation was first carried out in England by Mr. Charles Maitland, a surgeon, who after successfully inoculating the children of the Royal Family returned to Scotland, his native country, in 1726, and went first amongst his relations in Aberdeenshire, where he inoculated six children of gentlemen, of whom one, labouring under hydrocephalus, died, which raised such a prejudice against the practice that it was

banished from that part of the country for twenty years. In the same year, however, he inoculated four children of a noble family in the west of Scotland, who all recovered; while a fifth child of the same family, being thought too young and too weak to undergo this operation, took the natural small-pox and died. Soon afterwards the practice was introduced into Dumfries, a town where the natural small-pox was generally of a malignant kind. Here the practice was begun about the year 1733, and so gradually passed into other parts of Scotland. To this history Monro added a number of figures and arguments, pro and con, bearing on the value of inoculation; and then, evidently himself in doubt, ended by remarking that he "shall not draw any conclusion, but leave the determination of this affair to better judges who are appointed by public authority for this purpose." A true Scotchman, Alexander Monro.

In answer to the second question, Monro admitted that there was a mortality to the extent of one in seventy-eight amongst those in whom small-pox had been artificially excited. He compares this with Jurin's and Sceauchzer's estimates—namely, that amongst the affected by natural small-pox in several parts of England, one in six died, while of those affected by inoculation one in fifty died. On the third question, whether those who had been inoculated for small-pox were susceptible to the disease a second time, he was fairly explicit in the negative. On the fourth question, whether other diseases were ever introduced or owing to the operation, he said some were; and on the fifth point, whether these diseases happened more frequently or seldomer after inoculation than from the natural small-pox, he added that all his correspondents seemed to agree that "there are not near so numerous or various bad consequences after inoculation as after small-pox by natural infection"; and as he himself "had been so fortunate, or perhaps timorously cautious, that not one of those whose inoculation he had advised had a dangerous symptom during the disease, nor a bad consequence from it," he was, it might be concluded, of the same opinion.

The works of Alexander Monro are brought to a close with a treatise on *Comparative Anatomy*, composed from notes taken at his lectures by his son Alexander, and published by that gentleman in London in the year 1744, without the author's consent or knowledge. The treatise is sound and learned, and is original perhaps in regard to its title, now a household word. Many of the essays described as

belonging to the published works of the author were originally communicated to a society formed in Edinburgh by professors and others, and first appeared in the volumes of *Medical Essays and Observations* with which that society enriched the world of physic ; essays and observations which good students still read, mark, learn, and inwardly digest.

THE CLOSING CHAPTER.

The honours which were accorded to Professor Alexander Monro in his native city were not confined to her justly appreciative affection. He was crowned with honours from other countries. The Royal Society of London conferred on him its fellowship. The Royal Academy of Surgery of Paris gave to him its diploma ; and, in brief, his name and fame were known all the world over. His industry led him into the common as well as the higher walks of usefulness. He was a Director of the Bank of Scotland, a Justice of the Peace, and a Commissioner of High Roads, in all of which offices he played his part as well as he did in the university and by the bedside. A sincere friend to civil liberty, he allowed no party feeling to modify his humanity ; and after the battle of Preston Pans he flew to the field to give his services to wounded victors and wounded vanquished alike, doing also his best to save the unhappy Dr. Cameron, who fell on the scaffold a victim to what is called his loyalty to a discredited Prince and a ruined cause. He had, says Donald Monro—and we may accept the words, though they fall from an attached son—"great humanity and a sweetness of temper, with a singular liberality of sentiment. He was a sincere friend and an agreeable companion, an affectionate husband and a kind father, and was never more happy than when he could serve those whom he thought deserving."

Professor Alexander Monro (Primus) lived beyond the proclaimed threescore years and ten, when, full of days and honour, he sank, after a painful illness, into his rest. He was of strong build, but had, he thought, been injured in early life by the annual "spring and winter blood-lettings" to which he had been rigorously subjected, and which, despite his practical and important warning, were continued, as a practice, in these islands for more than half a century after his time. In 1762 he was a sufferer from influenza, then a catarrhal epidemic. His illness was attended with much pain in the mucous passages of the bladder and lower bowel, which pain continued until

his death with increasing severity. No medicine, opium excepted, gave him any relief. It was discovered after death that a "corroding fungous ulcer, two fingers' breadth," extended round the whole circle of the lower bowel, "with adhesion to the upper and back part of the bladder." His sufferings were borne manfully to the end ; death to him had no fear, and 'he talked of his own dissolution with the same calmness and ease as if he were going to sleep."

So closed the life of the first Professor of Anatomy and Surgery of one of the greatest schools of medicine the world has ever seen : a life right worthy of the beginning of that school, and worthy of its noble and splendid career even until now.

William Cullen, M.D., F.R.S., and the Growth of Physical Medicine

IN disposing oneself to the task of writing, in a condensed form, the life and labours of a distinguished man, the effort is easy or severe according to the nature of the man rather than the extent of his work. When the work is of one kind, showing the nature of a worker intent on one object, the biographer is relieved of much anxious thought. He can follow his text. When the work is broad and diffuse, not to say versatile, showing a worker of great comprehensiveness, the biographer is soon overwhelmed, and, if he be not careful, lost in the effort that lies before him. Details crowd on details, diversities on diversities, comparisons on comparisons, contrasts on contrasts, until, to the bewildered mind, concentration seems impossible.

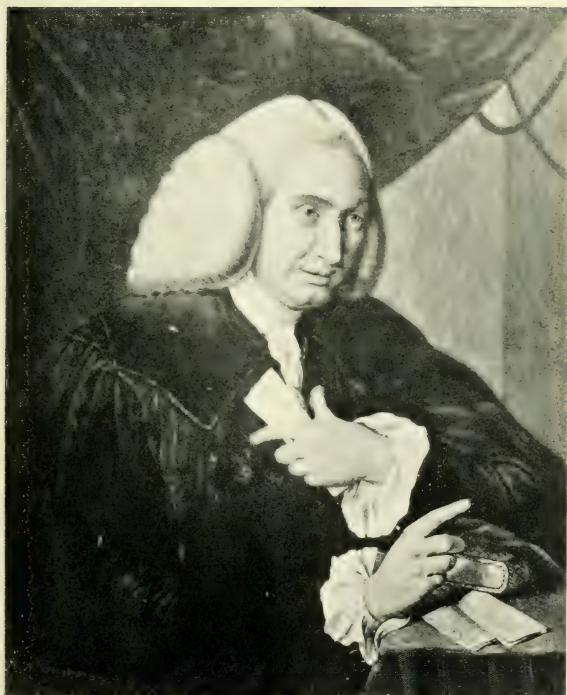
I have felt this difficulty of concentration most forcibly in studying the life of Cullen. The nature and work of Cullen, in every sense comprehensive, seem to admit of no compression. All his biographers have evidently been impressed with this feeling, and in their attempts to present their man in perfect view have become diffuse unto weakness. The most laborious of all the lives of Cullen is the worst offender in this respect, from which fact I gather the consolation that, inasmuch as the present essay must needs be short, in order that it may run in harmony with its predecessors, it may perchance be a sharper picture than many that have preceded it.

ON THE ROAD TO FAME.

If the reader can imagine himself entering an apothecary's open shop in Henrietta Street, Covent Garden, London, in the year 1730, a shop belonging to a Mr. Mather, apothecary, he will find behind

the counter, vigilant in business, a Scotch youth of twenty years. Our youth, plain William Cullen, who, young as he is, having been born on April 15th, 1710, has by this time passed through a good experience. He has been at the University of Glasgow as a gown student; he has been apprenticed to a member of the Faculty of Physicians and Surgeons of Glasgow, a rather learned man, Mr. Paisley; he has left Glasgow for London, after having acted as surgeon to a merchantman during a voyage to the West Indies; and now, on his way back to his native Hamilton, in Scotland, he has tarried awhile in London, gleaning a little practical knowledge of *Materia Medica* under Mr. Mather, the apothecary of Henrietta Street. He works hard in the shop, and, according to his employer, he works hard also at his studies when the business of the day is over. In conversation William is a careful youth. Let the subject of conversation with him be one on which he has little or no knowledge, he will listen and take no part; but speak to him at some subsequent period on the same subject, and beware, or he will confound you with his information. He has studied up the matter, until his tenacious memory has enabled him to retain a little library of knowledge, so well applied that he appears to be master of the position entirely. Is it a place that is under discussion, you would suppose he must have been to it; is it a substance, he must have handled it; is it a book, he must have read it; and this faculty he is destined to carry and exemplify throughout the whole of his life.

William Cullen had, at this time, himself alone to depend upon. He had long been fatherless. His father, an attorney and factor to the Duke of Hamilton, married Miss Robertson, of Whistleberry, and very quickly had a family of nine children—seven sons, William being the second, and two daughters. After the birth of the youngest of this family, the father died, and his mother married another attorney of Hamilton, named Nasmyth, by whom she had two children. The eldest son of the Cullen family went to the law. William, after going to the Grammar school at Hamilton, where he was under a teacher of great local reputation, Mr. Findlater, took, as we have seen, to physic as his profession, began his career as a surgeon of a merchant vessel, and afterwards entered as an assistant to a London apothecary. The London engagement lasted until the beginning of the year 1732, when, his elder brother having died, he returned to Hamilton, to assume his place as the head of the Cullen family, and to hold in his medical charge the son of Captain Cleland, under whom he had made his voyage to the West India Islands.



William Lullens

From an engraving by Val. Green, 1775, after a painting by W. Cochrane



On returning to Scotland, Cullen did not go direct to Hamilton to establish himself, but to Auchinlee, in the parish of Shotts, near to Hamilton, near also to a place where his father had held a small patrimonial estate. He remained in this place for two years, when, having come in for a little legacy, he removed to Rothbury, in Northumberland, to reside with a Dissenting minister there, and to study philosophy. He enjoyed two years in this manner, and then went to Edinburgh as a medical student in the University, took part in forming the society of students which afterwards became the famous Medical Society, and having passed through his studies, returned in 1736 to Hamilton, for regular professional work as a surgeon, and as attendant-in-ordinary to the Duke and Duchess of Hamilton, an appointment which brought him practice amongst the richest families the country round. Here he received as a pupil William Hunter, destined afterwards to be the famous Dr. William Hunter; and here, in November 1741, he married Anna Johnstone, daughter of the minister of Kilbarchan, in the county of Renfrew, a charming wife, with whom he held affectionate companionship for forty-six years, and by whom he had seven sons and four daughters. The illness of the Duke of Hamilton caused him to move from place to place, for nearly two years, in company with that nobleman, after whose death, in 1744, he removed to Glasgow, in the University of which city he had graduated M.D. in 1740.

So soon as he was settled in Glasgow, Cullen began to deliver a course of lectures on Medicine, and in the year 1745 he commenced to lecture in the University, with the design of following the example that had been set by Monro Primus, in Edinburgh, of forming a proper medical school. His first course of lectures, within the University walls, was on the *Theory and Practice of Physic*, delivered with the consent of Dr. Johnstone, the nominal Professor of that department, who held the chair, but gave no instruction. In 1747 he added to the lectures on Medicine a course on Botany and Materia Medica, in conjunction with Mr. John Carrick, followed by a course on Chemistry, which being adapted to general as well as medical students, was soon a popular course. In the courses of Medicine and of Chemistry he announced many original views, and from the first theorised without stint on points of the most abstruse character. From the prospectus or outline of these medical lectures he afterwards framed the plan of the famous *First Lines of the Theory and the Practice of Physic*, a book which held its place in the libraries of the medical world for over a century. Carrick, in failing

health when he joined Cullen in work, was before long removed from him by death, and so all the courses of lectures fell on Cullen alone. He conducted Medicine and Chemistry in the winter, and Botany and *Materia Medica* in the summer sessions.

Although thus actively engaged in University teaching, and although the University authorities furnished him with a laboratory, Cullen was not actually a Professor, in the strict sense of the word. He really acted for Professor Johnstone, with an understanding that Johnstone should resign in his favour at a favourable and not long deferred opportunity. Some political influence seems to have been required, the appointment being from the Crown, before the Professorship of Physic could be declared. This was brought about by the Duke of Argyll, to whom Cullen was introduced in 1749. Even then two years elapsed before his appointment was formally made, on the 2nd of January, 1751. In Glasgow, life seems to have been irksome to Cullen. His practice was small and widely scattered, his income poor, his labours overwhelming, and the sphere of his usefulness limited. "I am quite tired," he wrote to William Hunter, "of my present life," and he had thoughts of transferring to Edinburgh, to succeed there Dr. Plummer, the Professor of Chemistry. In that project he was supported by Henry Home, better known as Lord Kames. The matter hung fire until 1755, when the illness of Dr. Plummer made it necessary to provide a new Professor. For the chair there were three candidates—Dr. Francis Home, Dr. Joseph Black, and Dr. Cullen. For Cullen, Black had the profoundest regard, and between them there was no rivalry of a personal kind; still their election was a contest, which, through the active interposition of the Duke of Argyll, ended in the success of Cullen, who, on November 19th, 1755, was elected, by the Town Council, joint Professor of Chemistry with Professor Plummer during the life of the latter, and with succession to the full Professorship should Dr. Plummer resign or be removed by death. The death of Dr. Plummer was not long delayed; it happened in the following July, and thereupon Cullen reigned in his stead.

It was not altogether a bed of roses he found in Edinburgh. The medical professors were not friendly to a chemical colleague who also practised physic. Added to this, he suffered from a long and tedious illness, from "a broken shin" in the first session of his work, which tried him severely. In 1757 he began to deliver clinical lectures on Medicine, and soon obtained a reputation in that department, the simplicity of his teaching constituting the great charm.

The lectures on Chemistry and on Clinical Medicine went on until 1760-61, when the death of Professor Alston, to whom reference was more than once made in the life of Monro Primus, left vacant the chair of *Materia Medica*. At the request of the students, Cullen took up the course, commencing his lectures on *Materia Medica* in January, 1761, and continuing to deliver them until 1766. In the interval much strife arose on the appointment of a new Professor in the chair of Practice of Medicine, on the resignation of Dr. Rutherford, who for some reason did not like Cullen. Cullen, as a candidate for the chair, was backed up strongly by Lord Kames, by William Hunter, and by other distinguished persons; but in the Town Council Dr. Gregory was the favourite, and he carried the day. Later on, by the death of Dr. Whytt, a man of the finest qualities, the chair of the Theory or Institutes of Medicine was open to competition, and, by a general desire, Cullen allowed himself to compete. He was nominated, and elected to the office, his admission to the Professorship bearing date November 1st, 1766. This new appointment left free the chair of Chemistry, which was filled, according to Cullen's own best wishes, by the illustrious Joseph Black.

The arrangement for Cullen to teach the Theory and Gregory the Practice of Medicine did not please the students of the University. Between one and two hundred of them petitioned that the position of the two Professors might be reversed. After a brisk contention on the point, a compromise was effected: Cullen delivered a course of lectures on Practice of Medicine in 1768, and, until Gregory's death, in 1773, he and Gregory gave alternate courses on Theory and Practice. Gregory died on February 10th, 1773, and Cullen succeeded to the chair.

Some little time before he assumed the chair of Practice of Medicine, the portrait of Cullen which is published in the present biography was painted by Cochrane, at the request of many of the pupils of this famous master of physic, now in the fifty-ninth year of his age, and the reigning light of physic in Northern, perhaps in all Britain. For pupils he had men whose names became afterwards the most famous throughout the world, and having now won his way also to practice, he began to receive patients from all parts.

In 1773-4 Cullen presided over the Royal College of Physicians of Edinburgh, and during his presidency published a memorial on the custom of conferring degrees in medicine on persons who had not received a proper medical education, and who might, indeed,

receive the degree *in absentia*, on payment of a fee. Special attention was called to this practice by the notorious case of a man named Leeds, who, from being a brush-maker, suddenly vaulted into medicine by purchasing a degree from the University of Edinburgh, and advancing to London in 1766, had influence enough to get appointed as physician to the London Hospital. Leeds was a Quaker, and was esteemed amongst "Friends," but he came, nevertheless, under the criticism of another Quaker, the famous Dr. Fothergill, who gave one of his colleagues a warning respecting Leeds: "Take care he does no more mischief." The warning alarmed the Governors of the Hospital, who met soon afterwards, and passed a resolution, to some extent in force up to the present hour, that no one should hold the office of hospital physician who had not passed the College of Physicians of London. To meet this rule, Leeds presented himself for examination before the College, was rejected, and then made an appeal to the Society of Friends to get redress from Dr. Fothergill. The "Friends" took part with Leeds, and by arbitration awarded him the sum of fifteen hundred pounds, to be paid by Fothergill, as compensation. Fothergill refused, and in his turn referred the matter to a court of law, which through Lord Mansfield declared in his favour. The College of Physicians next took up the question, when their President, Sir William Browne, made a statement that Edinburgh did not possess a University, and had no power of conferring degrees; and this led to the memorial by Cullen above named. Cullen admitted that all the Scottish Universities had committed the mistake of conferring degrees without examination or proper proof of education; and he held the practice to be specially hard on the Royal College of Physicians of Edinburgh, because that College was obliged, by its charter, to grant licenses, without examination, to any person who had obtained a degree from any of the Universities of Scotland. As a practical remedy, he suggested that the Universities should "give no degrees but such as are honorary and given without fees, to persons of rank and distinction, or to persons who had given some public specimen of their literature and medical knowledge." The memorial called forth a long and witty letter from the illustrious Adam Smith, who, while not defending the practice of selling degrees, thought the sale did no great mischief, and rather laughed off the whole subject. Cullen was not convinced by Smith's philosophy; on the contrary, he did his best to save Edinburgh the shame of the scandal, and in so far as she was concerned he succeeded. By the course he took

he caused her degrees in medicine to be honoured wherever they were recognised.

IN FULNESS OF FAME.

We have now followed Cullen up to the fulness of his fame. He is a figure in history. With strong tenacity of purpose he holds on in his brilliant career, fighting many battles, including a fierce one with the erratic John Brown, not making much pelf, and always determined to follow what, according to his lights, was the right way. Two hundred consultation-letters came to him every year, something in that day thought to be astounding. Honours flow in upon him. The Royal Society of Medicine of Paris elects him an honorary Associate; the Royal Society of London elects him a Fellow (1777). He takes part in turning the Philosophical Society into the Royal Society of Edinburgh, and in 1778 he purchases Ormiston Hall, in the parish of Kirknewton, about eight miles west of Edinburgh. Ormiston is said not to have been a picturesque spot, but he took a fancy to it, and here he spent many of his days. All through his life, in Edinburgh, he had resided in the same house, in the Mint, not an aristocratic part of the town, but professional and comfortable; and now, entering into partial retirement at Ormiston he devoted his attention greatly to farming, but, it is said, with so little of profit to himself that when he died he did not leave sufficient means for the support of his daughters.

Of his sons, Robert, the eldest, born in 1742, became an advocate, and attained the fine position of a Lord of Session. Another, Henry, took to medicine, and showed some talent for his work, but died in 1790, too early to distinguish himself. Archibald, also brought up to medicine, went over to the law, and became a Chancery barrister in England. The other sons seem to have followed commercial pursuits, and to have wandered far away from the paternal home.

In 1786, on August 7th, Mrs. Cullen died, at Ormiston, a loss irreparable to her devoted husband, and one from which he never recovered.

Such, in the briefest language, culled from various available sources, including, of course, Thomson's, or rather the Thomsons'—Dr. John Thomson and his son William—life of Cullen, concluded by Dr. David Craigie, is the picture of the present Master of Physic, up to the time when life was growing weary to him, and the shadows

began to lengthen. A beautiful life, near to its end, to which we will not say farewell until, for a short interval, we look at the work of the life. We may then return to the scene of the grand ultimatum.

THE WORK OF CULLEN.

William Cullen comes before us as a phenomenon in medicine. I do not think it would be honest, in the very presence of his greatness, to say that he was an immortal discoverer. He was original from the beginning to the end of the chapter; he moved medicine from its centre to its circumference, and yet the most careful study of his labours fails to detect now one poor unit of actual discovery with which his name can be connected. In some things, too, as in the management of the insane, he was so far behind his time as to favour the treatment of restraint, and even of chastisement. Where, then, did his strength lie? To begin with, Cullen was a man of unfathomable industry. The day of his life was a whole day of work. Work with him was a pleasure, and I warrant that his hours flew like the shuttle of a weaver's beam. To his industry he added the gift of memory. He grasped and held, and whatever his eye swept over, that was his own, never to be lost, never to be given up. Undoubtedly he neglected hundreds of things which he meant to utilise, but which, like a miser, he was obliged to keep, hoping the day would come when he could take them in hand and work them out. He had no selfishness; mammon was never his purchase of the heaven of wealth and repose. Neither was he envious nor jealous; he had not sufficient veneration for the works of any one to feel the pang of envy, uncharitableness, or jealousy. On the contrary, his inbred good nature incited him to speak fairly of all men, including even his wildest opponent the renowned John Brown himself, amongst the rest. He was fond of teaching, and in the art and act of teaching was more of a student than the students he taught. His heart, too, was in the right place, and he was so intent on work he spent very little time in speculating on what people at large either thought or said of him. For what to men of the Cullen type is this life? "It is even a vapour, that appeareth for a little time, and then vanisheth away."

The faculties of the man were well balanced, and so strong that they would have been powerful in any age. It was fortunate for him that they came into operation just at a time when they could be applied with advantage to their owner and to the world. Several

new sciences or departments of knowledge were springing up out of veritable darkness, for the advancement of medicine; and what is more remarkable, they were all coming up at once—all new, and yet all correlative—all independent in themselves, and still a phalanx in regard to the place they were to take in the art of healing. Cullen, utterly devoid of the sense and craft of specialism, was made to receive all these developments, to seize their meanings, to try their bearings, and to introduce them, in order, into the medical world.

CULLEN AS CHEMIST.

In the light above stated Cullen was a chemist. Chemistry, when he rose, was emerging from its second stage of development. It had passed through its first days of childhood, of learning to babble and to speak, in terms more or less articulate. It had been a young man rejoicing in its strength, and, full of fond hopes and expectations, had leapt at conclusions which it could not sustain; but now it had reached manhood, and was beginning to rely on experiment pure and simple. It was learning, step by step, and was writing down its primitive lessons in a new method, letter by letter. Cullen came on in this stage, and seeing the right way, pursued it, not as a great unraveller of details, like Boerhaave, but as a pioneer who would cast an eye on promised lands, and report to others the splendid forecasts that lay there. He was methodical in this work. He began to use diagrams in illustrating chemical problems to his classes, and succeeded in making decompositions and double decompositions clear. He detected the natural lines of research in chemistry, taught that the lines to be followed were those of Nature herself as chemist, and seems to have felt a lasting regret that his other occupations, apart from the chemical, prevented him making demonstrative experiment the basis of his professorial instruction. He gained also a good idea of physical science in some of its branches, especially in relation to cold and heat, and their generation by mixtures. He forecast an agricultural chemistry, and clearly predicted that the produce of the soil would and must, in days to come, be so under the dominion of intelligent man that the earth should be what man would choose to make it, a sterile plain or a fruitful field.

In the Royal College of Physicians of Edinburgh the manuscript lectures of Cullen on the chemical history of vegetables still remain, to testify to his prescience as an organic chemist. They can mean little now as chemical studies of a practical kind, but as history

they are as valuable as in the day when they were composed and delivered. Lastly, in the chemical department he turned his mind to bleaching, and might, if he had proceeded with the task, have forestalled the French school of chemists itself in one of the most useful of the industrial arts. In short, as the eminent Professor Robison so admirably has said, "he succeeded in taking chemistry out of the hands of the artists, the metallurgists, and the pharmacutists, and exhibited it as a liberal science, the study of a gentleman."

CULLEN AS PHYSIOLOGIST.

In Cullen's day the science of physiology was beginning to take its proper place in the field of medicine. Like chemistry, physiology had passed through its preliminary stages of childhood and development towards maturity. It was more advanced than chemistry, for Harvey and the other anatomists had given it a helping hand. Mayow had brought his remarkable genius to bear upon it; Boerhaave had started many new problems of a physiological character, opening up organic analysis. Stahl had speculated ingeniously; Van Helmont had suggested the idea of vital decompositions; Van Leeuwenhoek had brought the microscope into service, and had made his singular discoveries on the construction of the blood and the tissues; Hales had thrown light on vegetable statics; the Monros, *Primus* and *Secundus*, had touched on many physiological problems; and, not to name many more, grand Thomas Willis had unveiled the nervous system with a perspicuity which calls for special study before it can be approached properly. Cullen, consequently, was not a founder of physiology; but he was a condenser and interpreter of the works of other men and of nature, and he took occasion to differ freely from those of his own day, as well as from his predecessors, when he felt he had reason for the difference.

The physiology of Cullen is, to our minds, of this day, singular and yet familiar. It reads like something that has been forgotten. The solid matter of a living body is composed, so he inclines to think, of "a simple solid." Nothing, he said, could be deduced from the chemical analysis of the solids, unless the chemist should be able to recompose the solids from the principles or elements that had been obtained during their decomposition. He held, briefly, that the solids were composed of water and a connecting substance, in its

nature a concreting substance, which could, by its concretion, make the water solid enough to be retained as part of itself—a crude view, yet near the view about colloidal matter which Graham has revealed in our time. He considered that the brain is the first organ formed in the bodies of animals, and consequently is the principal organ, the first to be considered, and the one vital of vital organs. He differed from some of his predecessors in his ideas about the ultimate structure of the solid matter. It had been assumed that the ultimate tissues were cellular in character—an assumption based, no doubt, on the work which had been already accomplished by the microscope. But inasmuch as active structures appeared to be fibrous, and as the cellular character of fibre had not been revealed, he was inclined to the view that solid structure should be considered as altogether fibrous in its nature, although he admitted the existence of a cellular substance on the surface of the fibres. He speculated on the subject of nutrition, and considered that in the earlier stages of development the growth of an animal was similar in kind to the growth of a vegetable, but that, later on, growth in length proceeds by an extension of the arteries, and in width by widening under the lateral pressure of the blood in the arteries. He further thought that the same extensions give rise to secretion, and to the transudation of fluids under pressure into the surrounding cellular tissue. By this extension of the arterial system, he argued, the several parts of the body are gradually evolved—some sooner than others, some later—as, by the constitution of the original stamina or after occurrences, they are severally put into such conditions as render them exposed to the impetus of the blood, and fitted to receive a greater quantity of it. “But as the parts first evolved will, by these causes, increase the most in the density of their solid parts, they will therefore more and more resist their former growth, and by the same resistance will return the blood with more force and in greater quantity into the parts then not so evolved. Hence the whole system will be at length evolved, and every part of the solids will, in respect of density and resistance, be in balance with every other part, and with the forces to which they are severally exposed.” In this view he had arrived at something very near to the true explanation of growth by anastomosis.

On the nervous system Cullen expressed opinions which were considerably different from those which he found advocated by his predecessors and cotemporaries, who maintained that the brain is a secreting organ, secreting a fluid necessary for the functions of the

nervous system, which fluid, being alternately exhausted and recruited, gives occasion to the alternate states of sleeping and waking. He objected to this view, at least in part. He considered that the whole of the living fibres in the different parts of the body are a continuation of the nerves, and that the nourishment of the soft and homogeneous solids everywhere is conveyed by the nerves. He surmised that the grey or cortical matter of the brain is secretory: that it absorbs from the blood the subtle nutritive part, and transmits its secretion to the white or medullary fibres, and that through those fibres the subtle and nourishing fluid is conveyed over the whole body. By this mode of reasoning Cullen set up a theory quite opposite to that of the Harveian school. The blood, according to his theory, plays a secondary part, and contributes little, if anything, to the nutrition of the tissues. Withdraw the blood, and there will be cessation of vital action, truly, but only because the brain has been deprived of its crude supply, and because the withdrawal leads to collapse of the blood-vessels, an event which must prove immediately fatal.

CULLEN AS PATHOLOGIST.

In the domain of pathology Cullen is supposed by many to have founded a new school. He did not found a new school, but that he propagated one is, I think, a fair and just inference. It seems to me that the foundation of what some have called the Cullenian pathology, especially in relation to fevers and the febrile states, was laid by Hoffman, and that Cullen merely modified and elaborated Hoffman. With the revival of letters the old Galenic obscurities on the phenomena of the febrile state began to disappear, and to be replaced by a rude chemical hypothesis, which attributed fever to a species of fermentation, and made it what would in this day be denominated, in a general, loose, and it might almost be said ignorant phraseology, a "blood disease." Thomas Willis, with his acute reasoning powers, was inclined to the hypothesis of fermentation, or, as we should say, zymosis, as the cause of fever. The mechanical school, which for a period eclipsed the chemical, assigned a mechanical cause. Sylvius de Boe was here the great leading authority. The increased action of the heart and velocity of the blood through the vessels were considered by his school to be the cause of fever, and the quick pulse the sign of the change that was in progress. But why the increased velocity? That was left

obscure. Boerhaave evidently detected the difficulty of this question, and in order to meet it ingeniously suggested that in fever there is formed in the blood an acrid substance, "a lentor," which thickens the blood, and gives rise to those obstructions which spring from viscosity. Then followed Hoffman, who seeing, perhaps, that the theory of acidity of blood was deficient, in steps of primary causation, advanced the speculation that fever consists in a modified motion of the muscular fibres, a change induced by nervous influence, leading to spasm in the minute ultimate arterial vessels. The theory of spasm thus advanced suited the mind of Cullen; it tallied and chimed in with his views of nervous function, and it accorded with his observation of the phenomena of a febrile paroxysm. The cold, the hot, and the sweating stages of fever run a natural course, one after the other; the stages stand in the series of cause and effect, the one to the other. In the cold stage there is universal arterial spasm, the spasm being a kind of *vis medicatrix*; the spasm is a cause of irritation to the heart and arteries, which after a time, like every other over-action, lapses into relaxation, succeeded in turn by profuse sweating and other signs of excessive elimination. The theory was remarkable, but, like its predecessors, it failed to go back to primary causes. Why should the minute arterial vessels pass into spasm? It is best to give the Cullenian reply, in the words of its author: "Upon the whole, our doctrine of fever is explicitly this: The remote causes of fever are certain sedative powers applied to the nervous system, which, diminishing the energy of the brain, thereby produce a debility in the whole of the functions, and particularly in the action of the extreme vessels. Such, however, is, at the same time, the nature of the animal economy that this debility proves an indirect stimulus to the sanguiferous system, whence, by the intervention of the cold stage and spasm connected with it, the action of the heart and larger arteries is increased, and continues so until it has had the effect of restoring the energy of the brain, of extending this energy to the extreme vessels, of restoring their action, and thereby effectually overcoming the spasm affecting them, upon the removing of which the excretion of sweat, and other marks of the relaxation of excretories, take place."

The old theory—one of the oldest, he declares, in physic—that fevers are caused by the entrance of morbid matter into the blood, and that the fever is an attempt to remove away such *materia morbi* from the system, he scouts altogether. "Fevers," he says, "are produced by cold, fear, and other causes, with all the essential

circumstances belonging to the disease, and terminating by sweat without any evidence or suspicion of morbid matter." The language here is explicit enough, and might be taken to imply that fever is always the result of a nervous impression, which would be very near to spontaneous origin. He qualifies a belief of that kind, however, by recognising as remote causes of fever some matters floating in the atmosphere and acting upon men, to which matters he gives the name of miasms or contagions. Of miasms he knew one only, that of marsh miasm, the cause of intermittents. Of contagions, he says, there are many, and he thought that for each specific contagious fever there is a specific contagion, but that there is one principal, perhaps one common, source of such contagions. His experience of gaol and other fevers, arising from bad sanitation, impressed him strongly with the idea that the human body, itself left under unfavourable conditions, could generate out of its own secretions poisonous substances, which might give rise to specific contagious disease. He was of opinion that the poisons of contagion act through a limited sphere, extending but a very short distance from the centre from which they emanate, and that their emanation from the excretions of the sick may be more dangerous than when derived from the body itself.

He was exceedingly earnest in his description of the effects of cold. Conversant with the different and, as they appear, contradictory effects of cold—now a stimulant, then a sedative; now an invigorator, then a devitaliser—he tried to account, as we still do, for the varying action of cold by attributing the differences of the phenomena to the differences of degree acting upon the arterial contraction.

Cullen was not great as a morbid anatomist. No doubt he dissected, but in this respect he was far inferior to Morgagni. As a pathologist, however, especially in a theoretical point of view, he showed an ingenuity of thought equal to genius of moderate quality. His pathology was based on his physiology, and so far was good in principle. His pathology of fevers was that the primary phenomena of fevers are dependent on spasm of the smallest arteries, and on the after changes which take place upon relaxation of the spasm. Every stage of fever he maps out by these modifications of function; and the method is so attractive, and, on the premises, so logical, it is neither surprising to read of the success with which it was received nor to recall the length of time it held its ground.

Inflammation he considered as differing from fever in that it is

local in its nature, and in that it has its own characteristics. The presence of the buffy coat of the blood, or "the separation of gluten," as he calls it, is, he held, generally pathognomonic of the inflammatory state; but the phenomena of inflammation are all consistent with an increased impetus of blood in the vessels of the part affected; yet, inasmuch as the heart itself need not be influenced at the time nor increased in impetus, therefore the spasm causing the resistance in the inflamed structure is local. The nature of inflammation is defined as a spasm of the extreme arteries, supporting an extreme action in the course of them, in all cases not derived from direct stimuli applied to the part. According to this view, inflammation is a local fever, but one which may become general by extension of the original cause of excitation. If the inflammation is removed whilst the affected structures retain their continuity the termination is by resolution: which resolution may be, (*a*) from reduced impetus; (*b*) from increased exhalation in the part; and (*c*) from increased impetus of the blood altogether, causing evacuation from the body sufficient to lower the phlogistic condition of the whole system. When the inflammation terminates by suppuration, the gluten of the blood (fibrine) is changed into pus, and abscess is the result; but in the abscess all that has been exuded is not retained; there has been an absorption of the thin or watery fluids into the blood, so that the condensed pure pus alone remains.

Cullen was fully acquainted with the effects of absorption of decomposed exudative matter from inflamed surfaces, and was also conversant with the dangers arising from extravasation into the structure of cellular organs. Thus in inflammation of the lungs the effused matter, by the mechanical impediment it throws in the way of the circulation, may occasion actual suffocation, a mode of death common to inflammations affecting the lungs and the pleural membrane. He was aware of the origin of plastic exudations on serous surfaces after inflammatory attacks, and of the accumulations of serous fluid which sometimes accompany the transudations of plastic material.

In summary, Cullen reduced the remote causes of inflammation into four heads: (1) External stimulation, like the cautery; (2) External violence; (3) Extraneous substances lodged in a part; (4) Cold sufficient to excite over-action, but not sufficient to destroy vitality. It is remarkable that he missed in this study the influence of internal stimulation in causing arterial spasm, but he did so, I believe, absolutely.

CULLEN AS NOSOLOGIST.

There is no work by which Cullen is so well known as by his *Nosology*. This book first saw the light in the year 1769, and passed through many editions, even during his lifetime, the edition of 1785 being the last he himself revised. I remember well that at the time when I became a student, his nosology was still in full force in the schools, and it is still the foundation of nosology, although very much changed. He tells us that he devoted himself to its construction with fear, and only under the impression that the task was a duty. He was not the first, as is generally taught, to invent a nosological chart, but he was the first to construct one that should be at once comprehensive and practical. Some great men, including Sir John Pringle, thought the task a work of supererogation, on the ground that the phenomena of disease are too variable to admit of strict classification; but Cullen, nevertheless, went on and succeeded. He had before him, for models to work upon: firstly, the nosology of F. Boissier de Sauvages, of Montpellier, who led the way on a suggested idea or plan of our own Sydenham; secondly, that of Linnæus, of Upsal; thirdly, that of Vogel, of Göttingen; and fourthly, that of Sagar, of Inglaw, in Moravia.

The works of these authorities Cullen took as his foundations. He commenced by delivering a short course of lectures to advanced students, and from those lectures he constructed the outlines of the *Nosology*, elaborating, step by step, until the whole was completed. He reduced the number of classes of disease named by his predecessors; brought the classes into orders, and the orders into genera, his object being to form a classification of the diseases which affect mankind, according to their natural history, by grouping together those symptoms which, without hesitation, may be admitted to be so frequently combined as to indicate a derangement of the body springing from a common cause, and coming, properly, under one name as a single disease. He was himself fully aware that this nosology would change as the study of disease advanced, but felt that he had sufficient to enable him to show a good beginning, and to leave some groups in such natural order as to remain, so long as diseases remain, on a natural and unchangeable foundation. There can be no doubt that he succeeded in this admirable attempt beyond expectation. Any one who will cast an eye over the *Nosology* will be astounded to re-discover, if his recollection of the great undertaking has become impaired, how much of it still holds good.

Cullen was, *par excellence*, a universalist in medicine and in science, a circumstance which prevented him from giving local affections a first place in his tables ; yet in spite of what some have considered a defect in this respect, he drew too near to commanding principles to be very far from the series of natural characters of all diseases, local as well as general ; for even nowadays, let us split up diseases into as many local divisions as we may, the conscience, together with the best knowledge of the practitioner, is alive to the truth that all local forms of disease are really subordinate to the general. Our tendency in these days is to classify disease according to producing cause. In Cullen's time the attempt was to classify according to symptoms. Perchance Cullen, after all, was nearest to the right method.

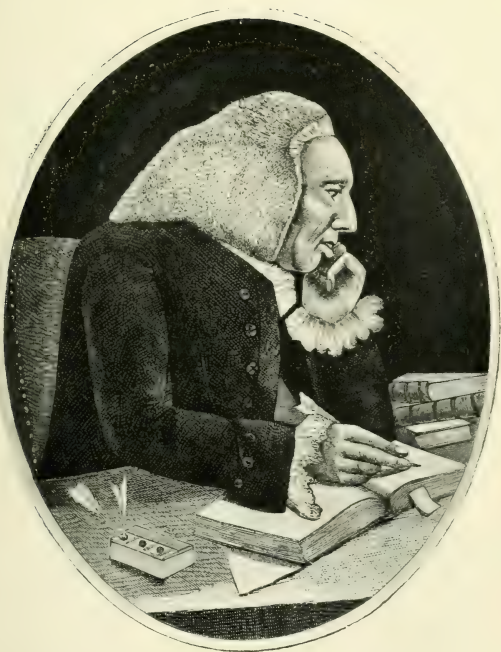
CULLEN AS THERAPEUTIST AND PRACTITIONER.

As a therapist Cullen was simple in all that he did. He was given to administer one thing at a time, and to test the effect of one remedy, carefully, before he proceeded to another. He discarded many remedies which had become literally worn out, but which clung to men with superstitious tenacity. He wrote a book on *Materia Medica*, which was a text-book of its day, although now long obsolete and a curiosity rather than an authority.

In practice Cullen was favourable to depletion, and in the life of John Brown some account will be found of the great controversy on repletion *versus* depletion, which waged between the two physicians and their followers. Cullen was a blood-letter, but he was not so irrationally. He was led, on logical grounds, to this practice, on the view that spasm of the arteries is the direct cause of the febrile and inflammatory states, and that the most immediate method for reducing spasm is to draw blood. Bearing on this point I have before me a letter from my distinguished friend Dr. George Balfour, of Edinburgh, so entirely expressing my own views that I quote it in its entirety. Speaking of the blood-letting practice in pneumonia, Dr. Balfour says that Cullen "was justified in his views by the prevailing science of the day, which taught that inflammation was due to spasm of the arterioles, and this, if not checked early, ended, as pathology was supposed to teach, in rupture of the bloodvessels, escape of blood into the lung tissue, and death possibly preceded by suppuration ;

red or grey hepatization being always present. But Cullen believed that the most efficient cure for spasm is blood-letting, and he strongly recommended this in pneumonia, not because his patients were more asthenic than they now are, but because he was no fool, and, with his light, regarded blood-letting as the only effectual remedy. In his *First Lines of the Practice of Physic* (p. 332, 7th ed.), he tells us that in his day there were many ready to faint on a small bleeding, yet who might with care have as much blood taken as was necessary. In a copy of his *First Lines* in our Library (Library of the Royal College of Physicians of Edinburgh) there is a MS. note in his own handwriting, pointing out that it was in his day no uncommon thing for patients to faint on the abstraction of only four ounces of blood; yet that there was no difficulty, even in these cases, in pushing blood-letting as far as was thought necessary."

This is a just estimate of the action of Cullen in the matter of depletion; but we have to turn to the *First Lines* themselves in order to see their author, in his ripeness, as a practitioner. The first complete edition of this work was published in the year 1784, and the preface to it, bearing date 1783, is of itself a study, revealing, in brief and yet forcible tone, the man as physiologist, chemist, practitioner, and scholar. Stahl, as he thought, favoured only the treatment of disease by expectation. Hoffman he extols as the founder of a new era in medical treatment, though he traces the elements of that foundation to Thomas Willis in his *Pathologia Cerebri et Nervorum*. Boerhaave, whom he first followed, he now ventures to dissent from in some particulars, and whilst he maintains that the only useful work in the practice of physic is making a collection of all the facts relating to the art, and of all that experience has taught us with respect to the cure of diseases, he doubts if the same can be accomplished without aiming at some system of principles, by a proper induction and generalisation of facts. He praises the study of morbid anatomy, as leading towards a knowledge of the proximate causes of disease. He endeavours to collect facts relating to diseases of the body as fully as the nature of the work will permit; but he has not been satisfied with giving the facts without endeavouring to apply them to the investigation of proximate causes, and upon these to establish a more scientific and decided method of cure. Further, in order to obviate any dangerous fallacy in proposing a method of cure, he has always been anxious to suggest that which, to the best of his



WILLIAM CULLEN.

Portrait by Kay, bearing date 1757, from copy in the possession of Henry Veasey, Esq., F.R.C.S., of Aspley Guise, Beds.

judgment, "appeared to be the method approved of by experience, as much as it was the consequence of system." Such, very shortly stated, is the scheme of the practice of Cullen, as set forth in the *First Lines*, long the text-book of the schools of physic all the world over.

POST-MERIDIAN.

The reputation of Cullen, rather slow to rise, seemed never to decline after it had once attained its height. He was consulted on all medical subjects at home and from abroad. His admiring disciples were everywhere spreading his name and his fame. The official personages asked him for information, and were satisfied. Lord Cathcart extracted from him a description of the best mode of striving to recover persons who are drowned; and the reply, although it does not convey anything that needs repeating, was accepted, at the moment, with the utmost gratitude. One event only could now prove a check on the career of William Cullen, and that was the event which shall certainly overtake the strongest of us—old age and decline.

The death of Mrs. Cullen, in 1786, told upon him powerfully; and it is doubtful whether Ormiston was the precise place for his repose. On a gate at the northern outlet of the Dingle, leading to the mansion, he had engraved the words from Horace, "*Procul Negotiis*," and on the front door of the mansion he had engraved, from the same poet, the words "*Est Ulubris*." The meaning of these sentences has been differently understood. It seems simple enough that the first should mean retirement, aloof from business; but the second, which refers to the solitary place where Augustus is said to have been educated, and which Juvenal describes as "*Vacuis Ulubræ*," is not so comprehensible; unless it means, as Thomson supposes, that a contented mind may be happy even in a desolate spot. However, there it was, and Dr. Balfour, to whom I am indebted for the autograph of Cullen, bearing date 1783, informs me that over the doorway of the house, now the servants' offices of a finer mansion, there it remains: "*Est Ulubris*."

In his prime Cullen was rather a handsome man in feature, but he had a stoop which probably took from his height. Benjamin Rush, one of his pupils, states that his face was long, his eyes blue but soft, his nose large and inclined to point downwards, his under lip protruding over the upper. "Over his whole face,"

says Rush, "was diffused an air of mildness and thought which was strongly characteristic of the constant temper and operations of his mind."

The portrait of Cullen painted by Cochrane, and engraved by Valentine Green in 1772, which accompanies this biography, bears out the description; and in the rooms of the Royal Medical Society of Edinburgh another portrait of him, painted by D. Martin and engraved by Bengo, and in later days by Holl, conveys much the same impression. Martin's portrait shows Cullen in his sixty-



BURIAL-PLACE OF CULLEN AT KIRKNEWTOWN.

seventh year, and would be a fine work of art but for a hideous grimacing bust of Hippocrates which the artist has thrust in, in order, it may be supposed, to make the Father of Medicine the admiring father of the great Professor.

Dr. Balfour informs me there is a plaque by Tassi, engraved by Ridley, old and ugly, with hanging under-lip. I have not seen this, but I present the reader with another very interesting portrait which, by lucky chance, I lighted on unexpectedly. Cycling, one fine summer afternoon, through the pretty village of Aspley Guise, near to Woburn, in Bedfordshire, I stayed, to receive a most kindly welcome from my old friend Mr. H. Veasey; and in looking over

the pictures in his study my eye fell on the portrait of Cullen, copied, by permission of my friend, for this memoir, and engraved, with the skill for which he is so appreciated, by Mr. Charles Ferrier. The plate bears date 1787, and was done by Kay, the well-known engraver and etcher, who drew the sketch of Lord Monboddo, with a tail. Kay, an uneducated man endowed with great artistic talent, was noted for giving the characteristic features of those who came under his pencil, but he could never manage a figure. He caught his portraits "flying"—that is to say, at a glance. Whitefield, Wesley, and other celebrities, were thus caught by him, and now his originals are much prized. In this portrait of Cullen he has caught the great physician during his last days, with shoulders high, face lengthened, and lower lip partly paralysed and fallen ; a failing man in his seventy-eighth year.

For two years after the date above named Cullen continued to carry on the duties of his chair. He resigned it in 1789, being nominally succeeded by Dr. James Gregory. The resignation was an occasion for a series of the most interesting events of respect and recognition. The Lord Provost, the Town Councillors, the Magistrates, and the principal Citizens of Edinburgh, presented him with a piece of plate, bearing an appropriate inscription. The students of the University raised a subscription for a marble bust, now in the University Library, by the sculptor Gowens. Addresses were presented to him from the Senatus Academicus, and from many of the learned Societies on whose roll his honoured name appeared.

William Cullen continued gradually to decline, without evidence of any special form of disease, until February 5th, 1790, when he died in his house in the Mint, Edinburgh, aged fourscore years within two months. He was buried, by his own request, without public ceremony, at Kirknewton, the parish in which Ormiston is situated, on Wednesday, February 10th, 1790, nearly in the centre of the burying-ground. No written memorial marked the spot, and it was only by a slab set up to his son, Robert Cullen, the Lord of Session, who died in 1810, that the tomb of the far more illustrious man was recognisable. In the year 1864 the Council of the Royal College of Physicians of Edinburgh placed over the dilapidated tomb a new tomb, with a medallion above the entrance bearing an appropriate inscription.

From Dr. Alexander Keiller, of Edinburgh—to whom I am

indebted for the photograph of the tomb of Cullen, from which the accompanying engraving has been executed by Mr. Ferrier—I learn that in the Library of the Royal College of Physicians of Edinburgh there are still retained many volumes of the manuscripts of Cullen, and at least one copy of his lectures, with numerous books purchased at the sale of his library in 1791.

And now another task is done. To reduce such a life of variety and work as the life of Cullen to a few pages; to be resolved to leave nothing of major moment out, and to be equally resolved to put nothing of minor moment in, has indeed been a laborious task. But, throughout, the labour has been lightened by the sweetness of it, by the communion of it, and by the richness of the classical ground that has had to be traversed. Sometimes, in writing these characters anew, one learns to love them, sometimes to pity them, sometimes to study them without any intensity of feeling whatever. Each one conjures up some new sentiment, which the reason balances. Towards William Cullen sentiment and reason alike suggest profound respect; and at the gate of his final resting-place I offer this tribute to his memory.

Joseph Black, M.D., and the School of Chemical Medicine

IN every scientific coterie the name of Dr. Joseph Black has a familiar sound ; but it is usually the sound of a name, as of a great and mighty wind, which comes few know where from, and goes few know where. Frequently the name is associated with stories of the eccentricities of men of science. At a dinner-table of learned men I was once informed, by an aged man of that modern Athens in which Black lived and died, that he (Black) was accustomed to walk about the town in boots made of tin. Further, the same authority stated as a matter of fact, which some, whom he himself knew, could remember, that Dr. Black was so given to self-absorption and abstraction, that his wife, in company with friends, would meet him in the street in one of his fits of abstraction, and, accosting him, would inquire after Mrs. Black and the family, with other family interrogations, and having obtained satisfactory replies would permit the entranced philosopher to go on with his meditations, without for a moment recognising who it was that had broken into them. The story was so well told we all accepted it as *bonâ fide* ; nor did I, for my part, discredit it, nor fail sometimes to repeat it, until the fact was revealed to me, on indisputable evidence, that Dr. Black never had a wife, but lived and died one of the most retiring of old bachelors that ever was known in the city of his adoption. Perchance, therefore, the story of the boots of tin is of the same shadowy nature as that about abstraction, although it does seem that he was a retired and thoughtful man, a man always thinking, and laying his thoughts by to grow and fructify under the light of an ever-widening and increasing knowledge.

Joseph Black was born in the same year as John Hunter (1728),

and, like that remarkable man, was of Scotch parentage on both sides of his family. His father, John Black, was a member of a family from Scotland that had settled in Belfast; his mother was a daughter of a Mr. Robert Gordon, of the family of Hilhead in Aberdeenshire, and her aunt was the mother of the illustrious Adam Ferguson. Mr. Black, father of our philosopher, went into the business of a wine merchant, was led, by business, into the south of France, and took up his residence at Bordeaux during the time when the grand Montesquieu was President of the Parliament of that famous place. He had a large family there, a prosperous business, and an excellent social position, as appears clearly from the following note, written by his distinguished son whose career is now under review, in respect to his parents and his birthplace, Bordeaux.

“My father was honoured with President Montesquieu’s friendship, on account of his good character and his virtues. He had no ambition to be rich, but was cheerful and contented, benevolent and liberal-minded, industrious and prudent in business, of the strictest purity and honour, very temperate and regular in his manner of life. He and my mother, who was equally domestic, educated thirteen of their children—eight sons and five daughters—who all grew up to be men and women, and settled in different places. My mother taught her children to read English, there being no school for that purpose in Bordeaux.”

The circumstances under which the children of Mr. Black were placed, in relation to their education, led him to send them away from home at an early age; and at twelve years, namely, in 1740, Joseph was sent to Belfast to a Grammar school there, where he remained until the year 1746, when he proceeded for a collegiate education to the University of Glasgow. At this time natural science was just beginning to show its modest face in the Universities, and to science, in its physical aspects, Joseph Black turned his mind. Dr. Robert Dick was the Professor of Natural Philosophy, and Black became his favourite pupil. Black also became the friend and companion of a son of Professor Dick, who, on his father’s demise in 1751, succeeded to the chair which he adorned until 1757, when he died of fever.

Left by his father to make a choice of a profession, Black chose that of medicine, not foreseeing, says his friend and biographer, Dr. Robison, during the gaiety of his youth, how much he would suffer by anxious solicitude and fears in the practice of this noble art.

His medical studies were entered upon under the direction and observation of Cullen, who at this period was intent on chemistry, as the science of sciences to be linked to medicine. In this intent, Black followed his master with the warmest enthusiasm, and soon became his assistant in the experimental part; for his genius for experiment showed itself from the first, and professor and pupil became fellow-students as well as fast and abiding friends.

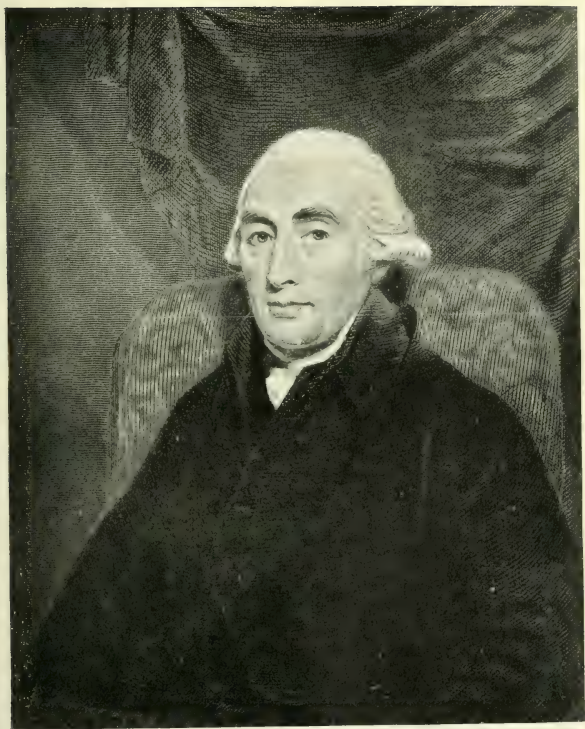
The first original researches in which Black was engaged were carried on, as Robison computes, in the years 1751-2, and had reference to magnesia and lime. The medicines then in use for the solution of calcareous concretions, and for stone in the bladder, were the so-called "caustic medicines," of which quicklime was the base. The causticity of the lime was assumed to be derived from the fire in which it had been burned, and this causticity, it was thought, could be conveyed by it to other bodies of an alkaline character. But when lime is exposed to the air it ceases to be caustic, because it has lost by the exposure its igneous property. The view was natural, and at first Black not only accepted it, but proposed to find out some mode by which he could entrap or catch the igneous part as it escaped. Possibly he tried the experiment and found it fail, for soon afterwards he made a note to the effect that "nothing escapes from caustic lime, but that such lime absorbs air." He weighed an ounce of chalk, calcined it, and weighed it again, putting down the loss that had been sustained. Again, he took another ounce of chalk, and after treating it with spirit of salt, collected the residue when the effervescence had ceased, and computed the loss of weight so obtained with the loss from calcination. Step by step he came to the discovery that lime, in its caustic state, imparts nothing to other alkalies, but that it has the property of removing from them the air which rendered them mild. But then it is itself no longer lime, for it effervesces, and good lime does not effervesce. Hence the inference that the causticity of alkalies is the natural property of those substances, and is not igneous. The alkalies do not communicate any igneous property to other substances, but they lose the primitive character belonging to them by absorbing something from the air. A cubic inch of marble is made up of about half its weight of pure lime, with as much gas or air as would fill a vessel holding six wine gallons. The lime, in combination with the air, is rendered tasteless and mild, as oil of vitriol is rendered tasteless and mild, in the form of alabaster, by treating it with calcareous earth.

The studies which led to these remarkable results were probably commenced in Glasgow, in the laboratory of Cullen ; but they were brought to their completion in Edinburgh, whither Black had moved in the year 1750-51, in order to carry out his medical studies, and where he took up residence with James Russell, the Professor of Natural Philosophy in the University. The position was in all senses fortunate, and was remembered by Dr. Black, with much satisfaction, to the end of his life.

Black made the studies he had followed in chemistry the subject of his inaugural thesis previous to his graduation in medicine in 1754. This thesis was dedicated to Cullen by its author, to whom also he addressed a letter on January 3rd, 1754, giving a new and singular bit of history on one of his experiments with what he then called fixed air—carbonic acid gas. In this letter he apologises to Cullen for not writing because of an experiment he was trying which amused him. "I had mixed together," he said, "some chalk and vitriolic acid at the bottom of a large cylindrical glass ; the strong effervescence produced an air or vapour, which, flowing out at the top of the glass, extinguished a candle that stood close to it ; and a piece of burning paper immersed in it was put out as effectually as if it had been dipped in water ; yet the smell of it was not disagreeable." This is the first note of knowledge respecting the physical action of fixed air—carbonic acid—on combustion, and marks out quite a new era in philosophical and experimental chemistry.

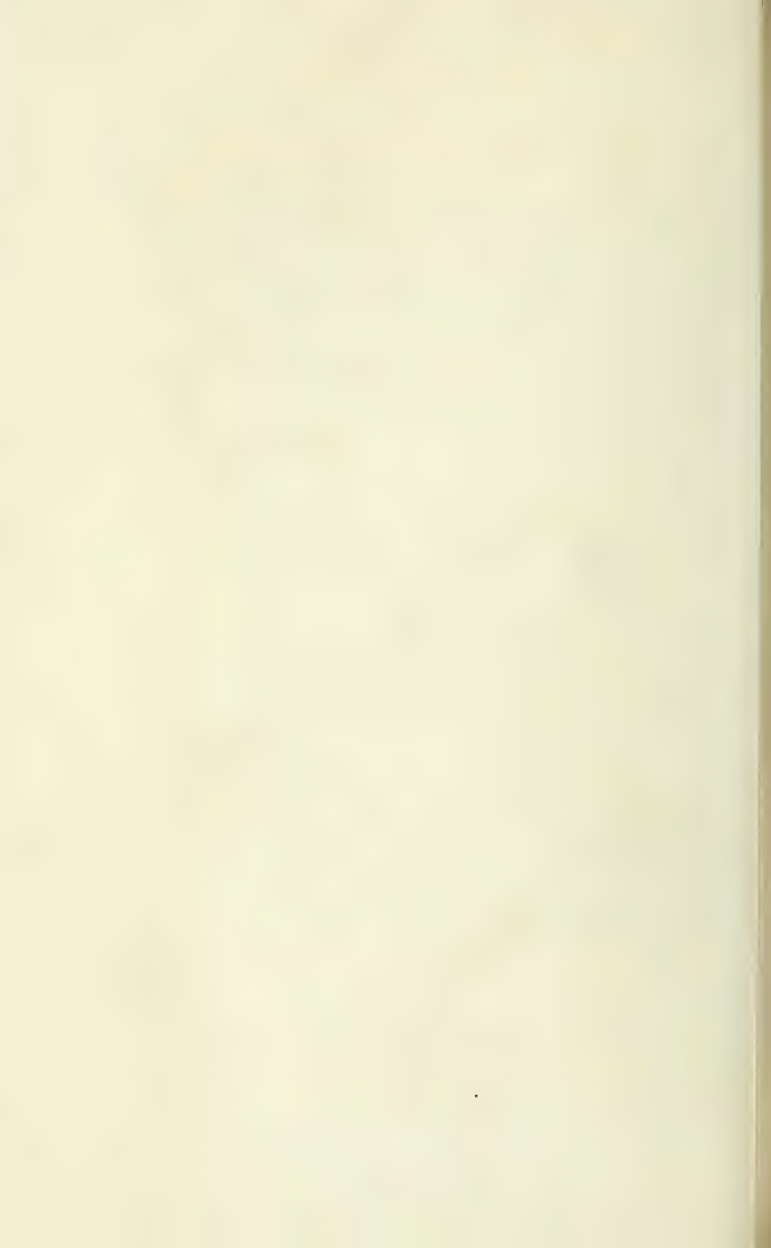
In 1755 the serious illness of Professor Plummer led to a contest for the chemical chair in the University of Edinburgh. Three candidates were brought forward—Dr. Francis Home, Dr. Joseph Black, and Dr. William Cullen. Home was supported by Lord Milton, an active lawyer and politician ; Black had the support of the medical fraternity, who preferred to have a chemist rather than a practitioner of physic ; Cullen had the support of Lord Kames, and the benefit of an immense reputation as a chemist. He also had the support of Black himself, who wrote to him two letters, informing him of Professor Plummer's condition, and stating that if he himself were elected to the chair he should refuse it. In the end Cullen was the successful candidate.

The election of Cullen to the chair in Edinburgh left the chemical chair in Glasgow vacant ; and who so able to fill it as Black, already a distinguished alumnus, and formerly the Demonstrator of Chemistry in that place ? He was elected, I believe, without opposition, and from the first was accepted as one of the greatest teachers of the



Joseph Black

From an engraving by C. Cook, after a painting by Raeburn.



science and art of chemistry that the world of science had ever seen. Speaking of this appointment, Dr. Robison observes: "On whom could it be bestowed with so much propriety as on such an alumnus of the University—on one who had distinguished himself both as a chemist and as an excellent reasoner; for I hesitate not to say that, excepting the *Optics* of Newton, there is not a finer model for philosophical investigation than the essay on magnesia and quicklime. Had this vacancy not happened it might probably have been the lot of Dr. Black to practise medicine in some provincial town of Britain or Ireland; and, thus occupied, the serious concern which he took in the cases under his treatment would have absorbed his whole attention, and might, perhaps, have overpowered his feeble constitution. It was therefore equally fortunate for himself and for the public that a situation now presented itself which allowed him to dedicate his talents chiefly to the cultivation of chemistry, his favourite science."

The learned Professor is perhaps too enthusiastic, in this passage, in praise of his hero and his friend. A man can never be more nobly employed, whatever his talents may be, than in the practice of medicine anywhere; and such men as Black, so original and truthful, rarely fail to find some line of labour in medicine which proves of service to their fellow-men. At the same time we may be happy in recognising that Black found at once the field of work that was most suitable to his love and his genius; for when love and genius blend with daily labour happiness of the purest quality is laid, and life is turned into a dream of pleasure. Moreover, if Black had taken to the practical art of medicine in its laborious routine his life would probably have been a drudgery; since there is no profession, trade or calling so hard to bear by those who are unfitted, by natural strength and will, to carry out its sacred duties. To such men—inadequate men for those duties—every act is a penance, and all life a march, bearing the cross of humanity.

Black found what he wanted; and in his entrance into the mere porch of the temple of fame made a distinguished mark. A copy of his inaugural essay was despatched, naturally enough, to the good old pater, still living at Bordeaux, and was transferred, also naturally enough, to the great Montesquieu, who, after reading it, expressed his views upon it in the warmest terms of praise. "Mr. Black, my very good friend, I rejoice with you: your son will be the honour of your name and your family."

The professorship in Glasgow was not confined simply to chemistry;

to it anatomy was added. With Black, however, anatomy was not a congenial study. He commenced to teach it with a conscientious resolution to carry out the duties faithfully, but soon made arrangements to exchange the anatomical chair with the Professor of the Institutes of Medicine. The exchange was excellent. His lectures on the Institutes fitted in splendidly with chemistry, and although he kept the two subjects apart, he drew a few rules of medical practice from physiology; and combined these with other rules deduced from successful practice alone, as distinct from physiology, which method he considered to be most conducive to a sound medical education. But it was in the study and the teaching of chemistry he most excelled, proceeding in the quietest and least obtrusive manner, with his mind always calm and free of ambition.

The most distinguished colleague in the University, at this moment, and whom the new professor could claim as a friend as well as colleague, was Adam Smith, the author of the *Wealth of Nations*. Their friendship, Robison tells us, became more and more intimate and confidential through the whole of their lives. A certain simplicity of character, with an incorruptible integrity, which was acutely sensible to the smallest indelicacy or incorrectness, was instantly seen by each of these friends in the character of the other, and riveted the bond of their union. Dr. Smith used to say that no one had less nonsense in his head than Dr. Black; and he often acknowledged himself obliged to Black for setting him right in his judgment of character, confessing that he was apt to form his opinion too generally from a single feature. "Indeed," adds Robison, "were I to say what intellectual talent Dr. Black possessed in the most uncommon degree, I think I should say that it was his judgment of human character, and a talent which he had of expressing his opinion in a single short phrase, which fixed it in the mind never to be forgotten."

At this period of his career Dr. Black carried out, in addition to his professorial duties, those also of a practitioner of physic. I observe that this part of his work has been denied altogether, or treated as if it were something of the mere amateur sort. Nothing can be further from truth. He practised actively and successfully: a fact testified by Robison from direct personal knowledge and observation. In 1763, according to this well-informed authority, Black was a favourite of the large and active city of Glasgow. His sweetness of manner, which the dullest eye might perceive to be free from all studious endeavours to please, and the evident concern

which he took in the cases under his care, made him a welcome visitor in every family. His countenance, at that time of his life, as engaging as his manner, was attractive; so that in the peculiarity of the general popularity of his character "he was in particular a favourite with the ladies, who regarded themselves as honoured by his attentions; nor were these indiscriminately bestowed, but exclusively paid to those who evidenced a superiority in mental accomplishments, propriety of demeanour, and grace and elegance of manners."

We have now followed Dr. Black into the first completed stage of his career. Henceforth we must look upon him as chemist above all else. He is still physician, and he may be held as such to the close of his life; but in that which he shall leave behind him, through which he shall be known always, we must accept him as the original chemical explorer.

THE WORKS OF BLACK, AND THEIR RESULTS.

In a literary point of view Joseph Black was rarely great. He wanted the gift of the man of letters, and he felt it a burden to undertake and carry out any literary task. His labours were chronicled in his lectures, and we are mainly indebted to one of his pupils and colleagues for the preservation of his choicest efforts. As a matter of literature the quantity is, comparatively, small, although what it represents must have demanded arduous and long-continued study. All his work is comprised in two volumes quarto of about five hundred pages each, and is extremely irregular in respect to value. In dealing with subjects of a descriptive kind, in which the details of his own experimental researches are reported and explained, nothing in the whole course of scientific literature can be better; nothing more clear, sound, original, or far-seeing. We have before us a man who knows what he is about, and who tells what he knows without any desire to praise or appraise himself. We are led to feel the deepest interest in what he is explaining, and are anxious to forecast what he is about to disclose. Also, we are led to ask what will yet come out of that which has been revealed? There is opened, in reply, to us who live more than a century afterwards, a revelation rich in wonder and instruction; showing to us that work, which men like Black perform, never loses its freshness, but comes up, over and over again, as a fountain we ourselves are continuing to use and utilise. All this is most satisfactory in the descriptive parts of the work; but when we come

to the more strictly philosophical portions—to argument apart from experiment, and to definitions which some would call abstract—we lose our hold on his mind. He is not even delightfully obscure, as many are. If he led us into a dream first, and then into a maze, and brought us out by waking us up in doubt and obscurity, we might be pleased and thoroughly grateful. We might possibly think that we had learned something, though we might not understand what it was or what it meant. Unfortunately, he leads us into the maze, taking care, all the while, to keep us awake, and to make us think over and analyse every word, whether we relish it or not. What is still more peculiar, he criticises some authors whose definitions seem to be as clear as crystal. In his first lecture on the definition of chemistry, he finds fault with Macquer's true, admirable, and simple definition that "chemistry is a science of which the object is to understand nature and the properties of all bodies by their analyses and their combinations." This, he says, is improper, "because in a great number of the operations which the chemist performs he neither divides compounded bodies into their principles, nor combines others which were separated before ; nor has he either of these ends in view in any of his inquiries." In a similar strain he criticises other writers ; and when he arrives at the point of defining for himself, he tells us that—"Chemistry is the science or study of those effects and qualities of matter which are discovered by mixing bodies variously together, or applying them to one another, with a view to mixing, and by exposing them to different degrees of heat, alone or in mixture with one another, in order to enlarge our knowledge of nature, and to promote useful arts ; or, in fewer words, that the chemist studies the effects produced by heat and by mixture in all bodies, or mixture of bodies, natural or artificial, and studies them with a view to the improvement of the arts and the knowledge of nature. This, in my opinion, takes in all that is proper to chemistry and inseparable from it ; and, at the same time, leaves out everything that does not belong to the science."

We should not in the present day attach importance to the definition of chemistry here given, and if the reputation of Black rested on these passages it would be small indeed.

RESEARCHES ON HEAT.

The above definitions were made in the introduction to his collected works. There, in the first part, on the general doctrines

of chemistry, he opens with an essay on the general effects of heat. He explains what he means by the word *heat*; next he defines the meaning of the term *cold*, and endeavours to ascertain the real difference between heat and cold. He mentions the attempts that have been made to discover the nature of heat, or to form an idea of what may be the immediate cause of it, and endeavours to describe the sensible effects produced by heat on the bodies to which it is communicated. Respecting the word *heat*, he uses it in one sense only—namely, as expressing that state, condition, or quality of matter by which it excites in us the sensation of heat. Cold he considered to be a negation of heat; but here he had to contend and overcome the theory, then extant, that cold was produced by frigorific particles, congealing particles which, by their actual presence, produced the effect. He succeeded in overthrowing this idea altogether, and in establishing the rule that coldness is only the absence or deficiency of heat. “It is the state most proper to common matter; the state which common matter would assume were it left to itself, were it not affected by any external cause.” “Heat,” he assumes, “is something added to common matter, or some alteration of it from its most spontaneous state.”

But what is this superadded something called heat? To answer this question he summons the great spirits of the past, beginning with Sir Francis Bacon, whose conclusion, drawn from the whole of his facts, is a very general one, namely, “that heat is motion.” “Sir Francis Bacon,” he says, “had many followers; but the great number of French and German philosophers, and Dr. Boerhaave, have supposed that the motion in which heat consists is not a tremor or vibration of the particles of the hot body itself, but of the particles of a subtile, highly elastic, and penetrating fluid matter which is contained in the pores of hot bodies, or is interspersed amongst their particles—a matter which they imagine to be diffused through the whole universe, pervading with ease the densest bodies—a matter which some suppose, when modified in different ways, produces light and the phenomena of electricity.”

Another hypothesis which Dr. Black had to consider, and to which he attached very considerable respect, was that of Dr. Cleghorn—viz., that the assumed elastic matter pervading all space, and entering the closest parts of the densest substances, has not only the property of great elasticity, and of strong repellency of its own particles, but possesses a strong attraction for the particles of the other kinds of matter in nature which have in general more or less attraction for

one another. This supposition would explain, he thinks, or is conformable with, some of the experiments of Dr. Franklin and Sir Benjamin Thompson.

It is most curious, as it is also most instructive, to read in this essay the very hypotheses which have, in our own day, been discussed and re-discussed so warmly. Heat as a mode of motion ; heat as the vibration of a subtle medium, filling all space and permeating all bodies ; heat as having powers of repulsion for itself, and of attraction for other particles, by which it both rends and combines matter (an hypothesis which Samuel Metcalfe so ably expounded), are, after all, mere repetitions of the period when Black flourished. If he clung to any one theory or hypothesis, it was to the last named ; but really he was not bound by any. Their first business, he taught his students, was to study the facts, and to attend to the manner in which heat enters the various bodies, or is communicated from the one to the other, with the effects which it produces. These effects, he said, are **EXPANSION, FLUIDITY, VAPOUR OR INCANDESCENCE, AND INFLAMMATION OR COMBUSTION.**

Following up his subject, under the heads named, Black is led, under the head of expansion, to treat on the thermometer. The invention of this instrument he credits to Sanctorius, who is distinguished by the discovery of what is called the "insensible perspiration" ; but the editor of Black corrects this statement, and assigns the invention to a physician by the name of Drebel, living at Alkmaer, in Holland, in the beginning of the seventeenth century. A fine history of the thermometer brings to a conclusion this section of the subject, and introduces the topic of the "distribution of heat," and of "the capacity of different bodies for heat." Here Black drew the inference that different bodies, though they be of the same size, or even of the same weight, when they are reduced to the same temperature or degree of heat, whatever that may be, may contain very different quantities of the matter of heat ; which different quantities are necessary to bring them to the level or equilibrium with one another. This fact, he contends, is unfavourable to the opinion that heat is a tremulous or other motion of the particles of matter ; because if such were true we must admit that the communication would be in conformity with our general experience of the communication of tremulous motion. The denser substances ought to be most powerful in communicating heat to others, or in exciting them. The fact, however, in a great many examples, and yet not in all, is just the reverse. The opinion is, therefore, totally inconsistent with

the phenomena, and he did not see how the objection could be evaded.

The "celerity of the communication of heat" formed a subject of much moment, and explained to the world many facts and inferences which were not well known previously. Here Black makes it clear that the heat of the sun is communicated, in the first place, to the earth, and is given out, from the earth, to the atmosphere; here he gives an estimate of the height of the atmosphere—namely, an approximate height of fifty miles, but with the upper strata very much attenuated. Here, also, he calculates that the diminution of heat is about one degree of Fahrenheit for every two hundred feet of elevation. The greatest difference of heat, therefore, balances two-fifths of the effect of compression, and cannot alone raise the air contiguous to the earth's surface to any considerable height. Were it not for the winds, the region of perpetual snow, even under the equator, would not be a mile from the level of the sea. But, he adds, there is a gradual and indefinable transition from the warmth of the lower air to the coldness of the higher, and in the higher regions the same gradual diminution of heat and compression.

CAUSE OF FLUIDITY.

Touching "fluidity," Black taught that we have the strongest reasons for considering heat as the efficient cause of fluidity, in all bodies in which this quality is found. He made this statement, as he believed, a matter of clearest demonstration by his experiment of dissolving ice in warm water, and illustrating from the experiment what he denominated the absorption of heat and the rendering of heat latent. His "summary" on this matter is submitted in the following words, rarely, if ever, quoted in full, but conveying his hypothesis in the most striking and intelligible terms:—

"I consider fluidity as depending immediately and inseparably on a certain quantity of the matter of heat, which is combined with the fluid body in a particular manner, so as not to be communicable to a thermometer or to other bodies, but capable of being extricated again by other methods, and of reassuming the form of movable or communicable heat." In this way he accounted for the specific capacities of bodies for heat. "If they act on each other so as to produce solution, or even softening of one of the bodies, heat will be absorbed; or if the mere heat of the mixture melts or softens them."

He applies this same rule to firm but malleable substances like iron and copper. If iron be beaten with a hammer, its latent or banked-up heat will be rendered current, movable, communicable, sensible heat, because the heat, so to express it, has been beaten out of the iron. The heat was not communicated to the iron by the hammer, as by a mode of motion, according to the Baconian idea; for if it were so, when the iron had cooled it could be brought back to the same glow at the same part, and would anneal by a repetition of the blows of the hammer. But now, to repeat the effect of producing heat from motion, the iron must be replaced in the furnace, in order to absorb and render heat, again, latent; then responding to the blow the metal will become quickened into the bright glow of sensible heat, movable and communicable.

LATENT HEAT.

From the study of heat as a cause of fluidity Black proceeded to "vaporisation" and the heat concealed in the vapour of water. He conjectured that during the boiling of water heat is absorbed by the water, and enters into the composition of the vapour produced from it, in the same manner as it is absorbed by ice in melting, and enters into the composition of the produced water. And, as the ostensible effect of the heat, in this last case, consists, not in warming the surrounding bodies, but in rendering the ice fluid, so, in the case of boiling, the heat absorbed does not warm surrounding bodies, but converts the water into vapour. In both cases, considered as a cause of warmth, we do not perceive its presence; it is concealed, or latent, and, "I gave it," says he, "the name of *Latent Heat*."

A little further on in the same discourse he repeats his proposition in another and more striking form, putting the words in italics: "*When a fluid body is raised to its boiling temperature, by the continual and copious application of heat, its particles suddenly attract to themselves a great quantity of heat, and, by this combination, their mutual relation is so changed, that they no longer attract each other, gathering into drops and forming a liquid, but avoid each other, separating to at least ten times their former distance (for a cubic inch of water forms much more than a thousand cubic inches of vapour), and would separate much further were they not compressed by the weight of the atmosphere; and, in short, they now compose a fluid, elastic and expansive, like air,*"

EVAPORATION.

Studies of this nature caused Black to enter into many practical inquiries belonging to his time. He had as a pupil, friend, and fellow-worker the illustrious James Watt ; and almost of necessity the steam engine, which he calls "the masterpiece of human skill," came under his observation. He describes the first steps which led to this invention, from the early labours of Papin and the Marquis of Worcester to those of Newcomen and Watt. Into this description we need not follow him, interesting as it is, but may pass to his studies on what he calls spontaneous evaporation of water from expanses of surfaces. He now brings us to a physiological effect, up to his time unrecognised, on the natural cooling of the human body. There is, he says, in the body itself a continual laboratory or manufacture of heat ; and, were the surrounding air of such a temperature as not to carry it off, heat would soon accumulate so as to destroy life. The excessive perspiration, supplied by diluting draughts, performs the same office as the cold air outside the tropics in guarding us from this fatal accumulation. "It is not unlikely that the constitution of the vessels of the lungs and the pores of the skin, which unfits them for bringing forward the lymph in sufficient quantity for carrying off, by evaporation, the heat generated by the vital functions, is the immediate cause of the heat in ordinary fevers." In illustration he explains to us what heats may be carried off in this way. Dr. Fordyce stayed, without great inconvenience, in a room heated to 260° Fahr. The lock of the door, his watch and keys lying on the table, could not be touched without burning his hand, and an egg became hard. His pulse was at 139 ; yet a thermometer held in his mouth was only 2° or 3° hotter than ordinarily. He perspired profusely.

The close of the first section of the work of Dr. Black is on the important services rendered by heat in nature. It is a wonderful peroration. In it fact combines with a true poetry in prose, which shows the brightness and genius of the man at the strongest period of his career. The part assigned to water in the creative scheme was never more splendidly sung ; the description is as clear as the purest stream that water ever made ; the accent as musical as the sweetest rill. The author literally warms to his theme. "Were the heat which at present cherishes and enlivens this globe allowed to increase beyond the bounds at present prescribed for it, besides the destruction of all animal and vegetable life, which would be the

immediate and inevitable consequence, the water would lose its present form, and assume that of an elastic vapour, like air; the solid parts of the globe would be melted and confounded together, or mixed with air in smoke and vapour; and nature would return to her original chaos."

CHEMICAL ATTRACTION.

After treating on the subject of heat Dr. Black proceeds to that of chemical attraction. He gives to Sir Isaac Newton the credit of the suggestion of this kind of attraction in minute particles of matter, and defends the use of the term "attraction," as employed by Newton, against that of "affinity" applied by his successors. He seized the idea of the minuteness of these attracting particles by estimating, from experiment, that a grain of silver could be divided into eighteen millions of sensible parts. He observed that the energy of chemical attraction is so limited, round the particles of bodies, that it is not perceptible, and that if we trusted to our senses no action would seem to take place until the particles came into the closest contact.

A section on chemical apparatus is rich in historical facts bearing on the appliances possessed by the most accomplished chemists a little over a century ago. Everything, as he describes it, is so simple, and the whole is so limited, in comparison with what we have now at command, that the chapter reads almost like a child's story. This chapter is succeeded by one on salts and crystallisation, in which much curious matter is discussed calling for renewed inquiry, especially in relation to the action of light on crystallisation, which Black believed to be negative, but which the editor of his works, following Chaptal, looked upon as proved. Equally curious are his accounts of earths, alkalies, acids, and salts, with which the chemist manipulates.

It is necessary for me to pass over these subjects of inquiry in order to arrive at that part of the labours of our great experimentalist which relate to his extraordinary suggestions and observations on what was called, by him, "fixed air." Upon his researches at this stage a new era in vital chemistry becomes developed, on which we must for a few minutes bestow a close attention.

RESEARCHES OF FIXED AIR.

The experiments with which Black commenced his inquiries on the subject of fixed air were made on lime; to some extent they

had commenced with magnesia as well as lime, but lime was the material chiefly used. He began his new series of research with lime-water. He made a very strong lime-water, and placed four ounces of it under the air pump, along with four ounces of common water in another vessel of the same size. The air was taken out of the receiver, and, while this was doing, air-bubbles formed and rose in both phials, in equal quantities, and in the same manner, as far as he could judge, while the lime-water continued perfectly transparent. From this he concluded that the air escaping from the lime-water had been combined with the water, and not, as had been previously taught, with the lime; he also concluded that the air which water commonly holds in solution is of a different nature from that which is attracted by lime and alkali. For had it been the same, and combined with the lime, as fixed air is, the removal of the atmospherical pressure would not have been sufficient for occasioning its separation. Quicklime, therefore, does not attract the air that is usually contained in common water, nor does it attract the whole of the mass of atmospherical air. It attracts only a particular kind of ærial fluid, which is mixed with the air of the atmosphere, in the way of common diffusion, and in a small quantity only. It is mixed as spirits are in water, or one metal with another, without any change of properties; and alkaline substances take it out, as aquafortis takes out the silver which alloys a piece of gold.

Here, says Black, "a new and perhaps boundless field opened before me"; and then he proceeds to teach what had been revealed concerning fixed air. Van Helmont had given to an elastic body the name of *gas silvestre*, and had supposed that it was the chief part of the gas given off from fluids in a state of fermentation. The same authority had conjectured that this same gas is given off from substances that are undergoing combustion: a random conjecture, as Black thinks, because he (Helmont) did not know a fact understood by the chemists of the later day, that the gas extinguishes flame. Dr. Macbride of Dublin had obtained some of the same air from fermenting vegetables, and from animal substances in a putrefying condition. The Hon. Henry Cavendish had separated, from alkalies and earths, by acids, a permanent elastic fluid, some of which he kept for twelve months in a vessel inverted into mercury, without any diminution of its elasticity. Cavendish also discovered that this gas was absorbable by water and some other fluids, and had calculated the quantities of it contained in marble and other bodies; he obtained the precise density of it, and showed the density to be

greater than that of common air in the proportion of 157 to 100; in consequence of which it lies at the bottom of a vessel, and may be poured out like water, extinguishing a candle as water would do. After Mr. Cavendish, Dr. Brownrigg came on the field, and indicated that ordinary water, charged with this gas or air, acquired all the qualities of some "spa waters," known as "acidulous mineral waters," brisk in property, and possessing the power of changing the infusion of litmus to a red colour.

The most remarkable series of facts to which Black refers were, however, those elicited by Lavoisier, who, having burned charcoal in pure oxygen, collected the ærial product, and found that the product was the result of a combination of the oxygen with the carbon; which experiment and induction were not strictly original, since they had both been anticipated by Hooke, who had explained long previously that the nitro-ærial spirit of the air, described by Mayow, combines in the combustion of bodies, like wood or charcoal, and that the product is a volatile compound which diffuses into the air.

In books on chemistry it is often stated that the discovery of this product from combustion of carbon was first made by Black, and that to him should be given the whole credit of the discovery of the production of fixed air and the evolution of it by the breath in expiration. In point of fact it is not quite so. Lavoisier demonstrated the production of the gas by the combustion of carbon in oxygen, and finding the gas to be acid gave to it the name by which it is still known, carbonic acid; and Black himself records that the production of the gas as a result of animal combustion had been proved "by the experiments of Scheele, Lavoisier, Goodwin, and Menzies." He (Black) demonstrated the same truth; and although he did not first disclose it, he made the truth so clear, and removed so sharply the many obscurities by which it had been surrounded, that he seems to be the prime and natural authority. In some senses, too, we may look upon him in that light; for he it was who made proof so easy that all could repeat it. For instance, he first showed the lime test for the gas. He found that by blowing it through lime-water the lime was precipitated. It was he who first collected the gas from the surface of wort in a brewery, and on shaking up the gas, so collected, with lime-water found again the lime precipitated. He performed another experiment. He unfixed the nozzle of a pair of bellows, put into the nozzle a bit of charcoal, just red-hot, and then quickly replacing the nozzle, plunged the pipe into the bottom

of a phial, and forced the air very slowly through the charcoal, so as to maintain its combustion, but not to produce a heat too suddenly for the phial to bear. When the air of the phial was completely vitiated he poured lime-water into it, and had the pleasure of seeing the water become milky in a moment. More curious still, he observed and recorded a fact, thought to belong to our own time, that carbonic acid may make the lime in water either soluble or insoluble, according to the proportion of it that may be present. Thus he observes: "It may appear surprising to you that the same substances which, added to lime-water, precipitate the lime by making it insoluble, should also be the cause of its re-dissolution when added in larger quantity. But the fact is certain, and it is not singular. For example, most of the compound salts can be made more soluble in water than they are in their perfect or neutral state by adding to them a superfluous quantity of acid."

It is, perhaps, fair also to Dr. Black to record that he first investigated the toxic action of fixed air or carbonic acid. He, too, was one of the earliest physicians to recommend its use in the treatment of disease. He commends it as a grateful substance added to water, and he speaks of its value as an outward application to ulcerated surfaces of the skin. He says that, when inhaled with five or six times its volume of common air, it is a good remedy, and has been found useful in the treatment of consumption and ulcer of the lungs. It is worthy of notice that Black thought the gas was less dangerous to breathe when it was taken in by the mouth than when absorbed by the nostrils. He observed this fact, particularly, in watching its action on sparrows.

I have observed that Black gave credit to the experiments of many of his predecessors and cotemporaries on the subject of carbonic acid, or, as he named it, fixed air. At the same time he claimed that he made its nature and properties clearly demonstrable in the year 1756; and it is incontestable that in this he was only declaring his own just right. Before his demonstrations all was conjecture, or part conjecture and part demonstration; he brought everything into demonstration. Some changed the name he had given of "fixed air" to "fixable air," after Mr. Cavendish; others called it "acidulous gas." Henry of Manchester and Professor Bergman called it "aërial acid"; Fourcroy called it "acid crayeux," acid of chalk; Lavoisier called it "carbonic acid," and this last name it has retained to our time; but Black isolated it completely when he published its properties as *fixed air*.

The remaining portions of the works of Dr. Black are full of understanding, suggestion, and learning; yet they are rather of a professorial than of an original character. They are the labours of a teacher of chemistry anxious to lay before his students all that could be usefully collected in the then field of chemical inquiry—a new field, and most laborious. Sometimes he was led from the chemical side of his work to the medical. Thus, in treating of iron, he refers to iron as a medicine, and relates the not very accurate knowledge of his time on that topic. He takes pains to illustrate the various instruments used in chemistry, and to classify the different varieties of chemical substances; in which effort he is far in advance of his immediate compeers. He is conspicuously fair to his fellow-workers in his descriptions of their services to science, and his account of the researches of Priestley and Cavendish excel in candour. In openness of spirit no author is more commendable. He enters into the thoughts and deeds of the actors as if he were one of them, and he delineates the course of discovery with a degree of conciseness that makes the reader grasp even grand progresses with an ease as refreshing as it is satisfying. The history of the discovery of “foul air,” afterwards called “nitrogen,” and still later “azote,” is a case in point.

THE CLOSE OF THE LIFE.

In the above notices of the works of our great scholar I have been led away from his career and his personal life. To some particulars bearing on these subjects it is now necessary to return. Fortunately we can return with advantage, for our authority, Professor Robison, was on the spot where Black worked, and was his familiar friend, pupil, and fellow-student. From Robison's memoirs we see Black, during his Glasgow life in the old University there, simple as a child, communing with nature, and yet fixing his gaze on secrets of nature which the highest reason might be proud to reveal. He had a pupil, at this time, working away in a small workshop opposite the University, where, in my time, we students bought our books of worthy Mr. Haddon, a bookseller, who never let any freshman leave his door without informing him that he stood in the birthplace of the locomotive steam engine, in the very shop where James Watt constructed his first model of that marvellous machine. Robison, on this spot, saw with his own eyes what his pen has written for us in a picture as living as when it left his living hand. Watt fitted up, from

his shop, the instruments that then were used in the McFarlane Observatory of the University. He chanced to have in his hands for repairs a model of Newcomen's steam engine, belonging to the Natural Philosophy Class, and was delighted with the opportunity which this small machine gave him for trying experiments connected with the theory of ebullition, which he had learned from Dr. Black ; "and he did not stop until he had made his steam engine more like the most docile of animals than a frame of lifeless matter." Watt, attached to Black by every tie of respect, esteem, and affection, supplied him with proofs and illustrations in abundance of all points on which the Professor wanted information. These were recited to the class—the fortunate class that saw the mighty engine of mankind put together in its infancy, and nursed into growth by the genius who understood its powers as well as its nature. One thing gave the master of this genius much satisfaction. Watt, who had obtained His Majesty's patent for the improvements he had made in the steam engine by his judicious application of Dr. Black's instructions, was now on the straight road to riches and fame ; and Black would scarcely have been more gratified had those advantages accrued to himself. This is Robison's testimony, the testimony of one who, as Professor of Natural Philosophy, was directly concerned in these splendid triumphs of practical science.

Dr. Black held the Chair of Chemistry in the University of Glasgow for ten years, namely from 1756 to 1766—"much respected," said Robison, "as an eminent professor ; much employed as an able and most attentive physician ; much beloved as an amiable and accomplished gentleman ; and happy in the enjoyment of a small but select body of friends." His reputation as a chemical philosopher kept increasing. Pupils came from all parts, and carried to all parts his peculiar doctrines on fixed air and latent heat. But progress would have been slow except for a wider sphere which was opened to him from the resignation of the Chair of Chemistry in the University of Edinburgh by Cullen, and his appointment to the vacant seat. His election to the chemical chair met with general consent, and his fame as a teacher and man of science was vastly extended. He became now more of the Professor and less of the original inquirer. He became one of the most favourite of lecturers, attracting to his lecture-room *dilettanti* as well as serious students. Under these conditions teaching became the first object of his life ; but, unhappily for the world, his health began so seriously to fail him that every kind of added exertion produced a

prostration which crippled him sorely. The slightest cold, Robison states, brought on spitting of blood, from which nothing restored him except repose and relaxation of thought, with gentle exercise. His natural bent was to follow up the pneumatic chemistry which Priestley had set forth, and to fight out the new problems that were springing up, with the most active of his compeers. But it was not to be. The spirit was willing; the flesh was weak. He followed rather than led; yet sometimes his original energy still exerted itself, as a correspondence with Lavoisier shows. Lavoisier had triumphed over the German school of chemists, which then, as now, claimed to lead the chemical world. Lavoisier had triumphed over the great German Stahl himself, and Madame Lavoisier (afterwards Countess Romford), dressed in the habit of a priestess, had burned on an altar Stahl's *Chemiæ Dogmaticæ* to the sounds of solemn music. The scene was dramatically absurd; still Black supported Lavoisier until that erratic star provoked him by ignoring him in his published writings, while flattering him "fulsomely" in his private correspondence. In this transaction Black stands forth with a simple grandeur which the unhappy death of Lavoisier at the guillotine does not overshadow.

In the community of Edinburgh Black was simply beloved. My late dear friend, Professor Macdonald, of St. Andrew's, knew intimately some who remembered Black personally, and who spoke of him as of one belonging to a distinct sphere of intelligence and goodness. Robison says of him that in early years he was comely, and in later days pleasing. His manner was easy, unaffected, graceful. His voice was gentle and musical, and his accomplishments in music and drawing above the average. "Love of propriety was the leading sentiment of his mind;" to which Dr. Ferguson adds that "he loved to promote social conversation by every cheerful thought that occurred. Many years member of a society of noblemen and gentlemen of first rank—of judges, lawyers, and professed men of letters—he kept his place with the most easy propriety, having knowledge sufficient for giving an interest in the conversation of each, and for taking a respectable share in it, without exhibiting any peculiarities arising from his more accustomed habits of thought. This society, and another small evening party, or club of gentlemen, more professedly scholars, were the only public companies which his delicate health permitted him to frequent."

In his latter years Dr. Black continued in the same frame of

contentment as in his younger life. Nothing seemed to disturb his natural serenity. When he was leaving Glasgow he lost three-fourths of his substance by the failure of a house in which he had invested his savings, and at another time he ran a most serious monetary risk in serving a friend; but he never complained or repined. As he declined with the century he had done so much to immortalise, he rested greatly on the judgment and care of his friend Dr. James Hutton, who "shared all his thoughts." He lived the most regular and almost abstemious life, and, anxious only to be saved a lingering sickness as prelude to death, was ready for the final change. His wish was granted. On November 26th, 1799, whilst seated at table with his usual fare—some bread, a few prunes, and a measured quantity of milk diluted with water—he sank. He had the cup in his hand when he was seized, and set it down on his knees, which were joined together, holding the cup steadily in his hand, like one perfectly at ease; and in this position he expired without spilling a drop and without a writhing on his countenance—as if, says the narrator of the event, "an experiment had been required to show to his friends the facility with which he departed."

In Monro Primus energy and business shone; in Cullen industry; in Black genius, insight of the highest order. Black was one who made history. Nowadays some men, recalling Baconian hypotheses, are holding up once more Stahl and his phlogiston. But they leave Black alone in his glory.

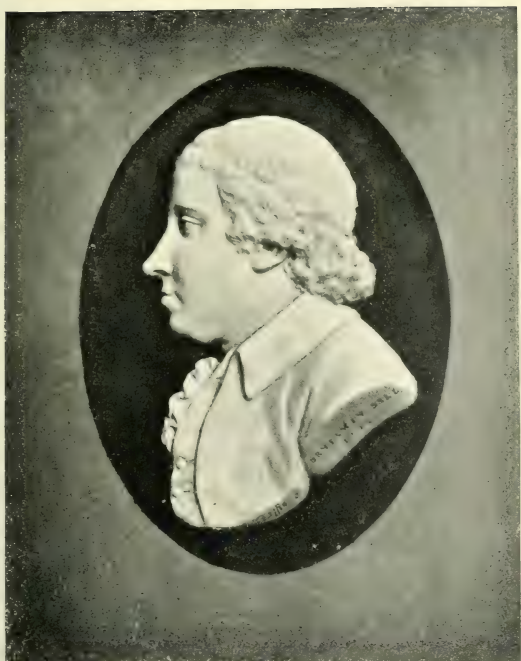
Benjamin Bell, F.R.S.E., and Systematic Surgery

IN the three last biographies we have had before us types of the leaders of medical science of the early School of Edinburgh, in the persons of Monro Primus, Cullen, and Black. The first of these represented anatomy; the second, theoretical and practical medicine; the third, chemistry and what may safely be called vital physics. In the present essay I propose to study, through one of the leaders of the same school in its early days, a representative of surgery in the person of Benjamin Bell, one of the surgeons to the Royal Infirmary of Edinburgh, and the author of that famous *System of Surgery*, which first brought together the art of surgery in broad and yet orderly form, presented the art to the student after the manner of a classical and authoritative work, and, "crossing the Border," entered, in its day, into the libraries of the English as well as the Scottish practitioners, ranking as the guide-book of the qualified man, the text-book of the student.

By descent our present master—surgeon, author, and sanitarian, for I shall have to refer to him in all these lights—was a "Covenanter"; not one extreme and active, but latently so, and solidly earnest.

The Bells were a clan in "the old Border times," so a later Benjamin Bell tells us; and George Bell, the great-grandsire of the subject of the present memoir, was both a Covenanter and a rebel; such a rebel that, although he was included in the Act of Indemnity in 1662, he had to pay for his release the good round sum of one thousand pounds in Scottish money.

George Bell had two sons—William, the elder, and Benjamin. William became heir to the paternal estates, including the home farm of Blackethouse on the banks of the Kirtle, in the parish of Middle-



BENJAMIN BELL, F.R.S.E.

*From a photograph, by Moffat, of a medallion by Tossie, 1792, now in the possession of
Dr. Joseph Bell.*

bie. He did not retain the property very long. He sold it all, probably to cover family liabilities; but his brother Benjamin, who occupied one or more farms under the Duke of Buccleugh, and took to the rearing of stock, succeeded so well that he bought back Blackethouse, an old tower near by, and some adjacent lands called Cushathill.

Benjamin Bell, the rearer of stock, married a Cumberland lassie, Rebecca Graham, of Breckon Hill, and amongst other children of his family had a son whom he named after his own father, George, and who, in his day, became a farmer and breeder of stock at Woodhouselees. This second George was an eccentric character, fond of practical jokes, in carrying out which he sometimes took a personal and prominent part. In the year of the Rebellion, 1745, he married Ann Corrie, a daughter of James Corrie, Esq., of Speddoch, in Dumfriesshire. It was a long and happy union, extending over seventy years, and resulting in a family of fifteen children, the second of whom, and the eldest on the male side, was Benjamin Bell, the man destined to become the leader of surgery for a long time in the metropolis of the North: our surgeon, author, and sanitarian.

The family record states that Mrs. George Bell was a lady of marked individuality. She was calm and placid in temper, and exercised the most beneficial influence over husband and children. She lived to have her portrait painted by Sir Henry Raeburn when she was nearly ninety years of age. She was of Puritan descent, her great-grandfather having been Alexander Gordon, "the Covenanter prisoner of the Bass," whose faithful wife was Janet Hamilton, daughter of Sir Thomas Hamilton of Preston, one of the heroes of Dunbar and Worcester. She survived her husband, although he lived until the year 1813, and reached the patriarchal age of ninety-one. Mr. Bell was a man of original cast of mind, respected by all his circle in spite of his eccentricities, and noted his country round for introducing turnips and clover into the agriculture of his district.

OUR SURGEON AND PRACTITIONER.

The subject of the present memoir, son of George Bell and Anne Corrie, was born in April 1749, in the town of Dumfries; and, after his preliminary education under Dr. Chapman, Rector of the Grammar School, was apprenticed, according to the custom of the day, to Mr. James Hill, a surgeon in Dumfries. He was, in a side

way, connected with medicine, for one of his aunts on his father's side was married to Mr. John Mowat, a surgeon in Longtown, a man born in 1660, who lived to 1776, a period of one hundred and sixteen years, who performed the operation of lithotomy after he had completed his hundredth year, and who some years later, on going to visit, professionally, his friend Dr. Graham of Netherby, fell upon the Esk while it was frozen, and broke his thigh-bone in the fall, but recovered, and resumed his work as a country surgeon.

After serving his time with Mr. Hill, Benjamin Bell proceeded, in 1766, to Edinburgh, a lad of seventeen, to become in due form a student of the already famous medical school. Our previous studies relating to medical life in Edinburgh at this period will convey the fact that he commenced his work under the most favourable auspices. Alexander Monro (Monro Secundus), a man who, as I think, was an abler teacher than Monro Primus, and who certainly has left better scientific work behind him, occupied the chair of anatomy. Cullen was rising into his fame, and Black was also making his way. Altogether the start was good for Benjamin Bell, and he made the most of his opportunities. In November 1767 he was a dresser in the surgical wards of the Infirmary, and in May 1769 was taken on trial as surgeon's clerk, to which post he was duly elected by the managers, on the recommendation of the staff, on July 3rd of the same year. On January 1st of the session 1770 and 1771 he was re-elected, resigning the post on April 1st of the last-named year.

Some interesting letters, written by Bell to his parents at this period of his life, give us an insight into practice as then carried on. His mother seems to have been a sufferer from headaches, for which, naturally enough, she consulted her firstborn son, now surgeon's clerk in the great Infirmary. He sent her for treatment bark and wafers. One of the wafers was to be floated on water until it was rendered soft; then a portion of the bark, in powder, as much as would cover a shilling, was to be put on the wafer; the wafer was to be doubled up, and the whole swallowed. It would go down "without the least taste," and the dose might be repeated four times a day. In the same letter he prescribed for his tiny brother Eben, who was teething. The mother, if she should see an inflamed gum, was to scarify it with one of her nails, and was to insert a pea-issue either in the neck or arm. Mention is also made in the letter of an outbreak of cattle plague on Captain Ewart's farm in Nithsdale, and it is recommended that if the same calamity should break out at the farm at home the

affected animals are to be killed on the spot. "There is no other way," he says, "of curing the disease, it is so quick in its progress ; often so quick that the beasts drop down dead the minute they are exposed to the contagion." To which he adds the curious fact, showing that our legislators knew how to stamp out cattle plague over a century ago, "There is an Act of Parliament requiring every person to do so, and at the same time entitling them, from the Government, to every farthing's expense they suffer in that way. And, accordingly, when the disease, about two months ago, broke out in the West Highlands, two hundred cattle were immediately killed, which effectually prevented, with other measures, the contagion spreading further."

With the view of his resignation of the office of surgical clerk before him, Bell began to think of making a tour to London and the Continent in order to improve his professional, and especially his surgical, knowledge. He explained his reasons for this step in a letter to his father, bearing date January 19th, 1771. If he had been entering the world, he observes, as a physician, he would never have thought of going further than where he had been ; but for a surgeon Edinburgh comes greatly short of either Paris or London, and for that reason Dr. Monro and others to whom he had spoken upon the subject "approve of the scheme very much." The tour will cost £150, a sum which he thinks will be well spent in the advantages that must accrue. The information is of value to us now as an indication, historically, that Edinburgh was not great as a surgical school in its early days, though very great as a medical ; and that the usual Continental tour so much coveted by all ambitious students was not so expensive, after all, as has been supposed. The journey took place, and lasted some months ; but unfortunately few details of it have been preserved. One letter, addressed to Cullen from London on March 30th, 1772, deserves, however, a passing notice, as throwing, amongst other things, a glimpse on the brothers Hunter, then in London, and on the tide of their success :—

"Amongst other obligations which I lie under, that of your letter of introduction to Mr. Hunter I consider as none of the most trivial, for by it I have had the pleasure of a most agreeable and, at the same time, the most useful, acquaintance I ever met with ; for there is scarce an article, either in physic or surgery, that Mr. Hunter has not something new upon, and there is none more ready of communication than he is. I am also just now attending Dr.

Hunter's anatomical course, which is indeed extremely ingenious and satisfactory ; but the Doctor is by no means so free or so ready of access as his brother."

In the course of this letter there is a notice of the publication of Hulme's essay on puerperal fever, and of Macbride's volumes of the practice of physic ; but the most curious part of the letter relates to a visit paid on March 26th to the Royal Society, when a paper was read by Dr. Priestley upon the nature and properties of air. "Priestley," Bell remarks, "adopts Dr. Macbride's theory of fixed air and putrefaction, and mentions the effects of such air on putrefaction." One very bad case of putrid fever was related, in which fixed air was injected into the bowels by the rectum in considerable quantities ; the patient seemed to be relieved from the first application, and to be cured by it. In this same paper Priestley also explained his immortal discovery that mephitic air, confined with growing plants, is not only thereby entirely changed and again rendered pure, but the growth of such plants is likewise considerably quickened ; from which he concluded that the bad effects of the breathing of animals upon the atmosphere are counteracted by the plants which are everywhere found upon the earth, and that such air is even, in some degree, necessary for the proper production and life of plants. In the same letter Bell describes the discovery of "a new acid," by the famous chemist Scheele of Stockholm—Scheele's hydrocyanic acid, as we now recognise it.

By this time, in the course of his life, Benjamin Bell had become, in a curious way, a man of substance, and, in point of fact, the landlord of his own father's farm, his grandfather, after whom he was christian-named, having left him his property upon the demise of his uncle Thomas, who had a life interest in it. Uncle Thomas died some time before 1772, and so the property fell into his hands, his own father having been passed over, perhaps because he had twice failed in business in early life, perhaps because the older man had a special affection or admiration for his grandson. The position was a painful one for the young surgeon ; but he carried out the duties of possession with remarkable tact and filial respect, even under circumstances particularly disadvantageous, as the correspondence on business affairs between father and son demonstrates.

At the age of twenty-three Bell returned to Edinburgh, and commenced practice in a very simple way. He took up his quarters with his sister Rebecca, and is not ashamed to say that he had a "shop," which he purchased of a man about to decline "business,"

and which he bought over, "drawers, counters, mortars," etc., and set up "in a room above stairs." His sister still calls him Ben, and begs her mother to send them butter, and another quilt for Ben's bed, because the one she bought is too large and it would be "a pity to cut it." The start was simple enough, but it went on for a time excellently. The young surgeon, with a shop, and a quilt too large for his bed, was elected in the first year of his practice (namely, on August 3rd of the year 1772) Surgeon to the Royal Infirmary—an office he held for twenty-nine years—and practice came steadily in.

After being in practice for about three years Bell married Grizel Hamilton, the daughter of Robert Hamilton, Professor of Theology in the University, and twice Moderator of the General Assembly. His marriage with Grizel Hamilton was one of the unlooked-for events of his tour on the Continent. During that time he had as a companion the brother of his future wife, James Hamilton, afterwards the author of the well-known book on the administration of purgative medicines. The two young men were fellow-boarders in Paris, in the house of the distinguished Baron Portal, whose works to this day are a part of every good medical library, and who had already published his two volumes of the *Précis de Chirurgie Pratique*. Companionship under such favourable circumstances brought about a warm friendship and, ultimately, a relationship by marriage, of a near and close kind, between the two young men; a relationship favourable to them both, and happy to the end.

Life is chequered. In the first period of his married and promising career Bell met with a physical accident that disabled him for two years. He sustained a fall from his horse, which prevented him following his professional work, and filled his mind with fears that he would never recover sufficiently to resume that work. With much resolution and resignation he had himself removed from Edinburgh to Liberton, three miles south of the city, where he took a farm on lease, and having a natural liking for agricultural pursuits, determined to settle there if the worst came to the worst. Fortunately his gloomy expectations or fears were not realised. A story that his mind had become affected was untrue, and under rest of body he made a sound recovery. The repose was not lost, for during the two years of it which he had to bear, he made preliminary provision for the works of authorship he had in store after practice had ripened his experience. Fortunately, also, the taking of the

farm at Liberton was not without its good, for the farm continued to be his summer residence for many long years, and was to him a blissful place of rest in health and in strength, as it had been in sickness and debility.

On resuming his professional duties in Edinburgh Bell resided in Assembly Close, his sister Rebecca still remaining with him. Before he left practice to retire to Liberton he was making about £400 a year; and now, although he was at first enfeebled and unable to climb six-storied houses to visit the sick, he soon made new headway, and "got fixed at last in a very good house, well aired and lighted, with an easy access of one story from Niddry's Wynd, and an entry from Kinloch's Close, without any stairs." This was in September 1777. Next year he required two horses from his father for business purposes, horses that would run together, since he had given up horse-riding because he had no time for it—good signs of increasing labour in the practical line. He was also on the look-out for the appointment of Surgeon to Watson's Hospital, to which office there was a little emolument; an office which he obtained in 1778, and held for the remainder of his life, and which passed through three succeeding generations of the Bell family.

In 1777 the rising surgeon was blessed by the birth of a son, christened, by his grandfather—Professor Hamilton—on the day of his birth (February 2nd), George. The news is conveyed in a letter to Grandmamma Bell, with many details of family interest. The fact is told that the happy mother was attended by a midwife, and was doing so well that this important functionary was dismissed soon after the great event was over, and that Mrs. Bell had her mother with her, so that she could "be at no loss" for attendance. The child thus born was a child to be proud of. He became, in due course, a member of the fraternity of physic; distinguished himself as a student of the London Hospital; went back to Edinburgh to join his distinguished father in practice; and, like his father, left behind him as honoured if not as famous a name.

A letter addressed by Bell to his father in July 1778 indicates that he had been in partnership for a time with a Mr. Gibson, a man of good repute, and that this co-partnership was about to be dissolved. In the autumn of this same year he had a daughter born to him, who received the name of Jane. Another letter to his father, dated February 4th, 1779, tells a story of wild religious excitement in Edinburgh against the Roman Catholic Bill. The well-wishers of the Protestant cause were invited to meet on a Wednesday evening

to pull down a monument of superstition, an elegant house lately built as a Catholic chapel at the foot of one of the northern closes. The day named was a feint, for the people met on the previous Tuesday evening ; and, although the town guard and four hundred of the South Fencibles were turned out in an instant, and long before any mischief was done, yet even in the face of such a number of armed men, with the magistrates of the place at their head, the furniture of the chapel was first of all destroyed, after which combustibles were got at, and the building, in a few hours, was reduced to ashes. Several individuals of the Romish faith were attacked, and next day, in the open sunshine, the houses of different people of that persuasion were ransacked. One woman, Mrs. McDonald, was used so barbarously that she and her child, of which she had been delivered only a few days, died on the same day. Even Protestants who expressed themselves in favour of granting religious liberty to Roman Catholics were doomed to suffer. Principal Robertson's windows were entirely demolished, and he and Mr. Crosby—the original of Sir Walter Scott's Mr. Pleydell in *Guy Mannering*—and Sir John Dalrymple, were marked out for revenge. Three troops of dragoons, brought into the town, finally quenched the outbreak, and restored order.

For many years after this date Mr. Bell's practice continued to increase, and so trusted did he become, it was a saying in Edinburgh that no one would willingly die without being visited by him. His practice extended beyond the mere domain of surgery and surgical art ; yet, above all, he was the operating surgeon, careful and conservative in his selection of cases for operation, skilful in diagnosis, firm, precise, decisive, and ready in the course of all his operative procedures. How much he was esteemed is conveyed in a communication written by the late Mr. James Wardrop, a London surgeon who died not a great many years ago, and to whom I was once introduced by Sir William Fergusson. Wardrop looked on Bell as one of the best and shrewdest observers he had ever known. He knew Bell in his early life, owing to the fact that his uncle, Dr. Wardrop of Edinburgh, was for a time one of the firm of Bell, Wardrop, and Russell. Speaking of Bell as he remembered him in the year 1796 and later on, he remarks of him : " His manner was devoid of every kind of ostentation. He was of a kindly disposition, and in stating his opinion made use of very plain and accurate language. He had an impressive mode of expressing himself, giving great assurance and confidence to the sick. In all the excitement of

surgical operations he displayed the greatest composure. He was a successful operator, and during many years was more employed than any other surgeon in Scotland." James Wardrop was, for a time, admitted into a junior copartnership with the firm, and knew all the members of it in private as well as in professional life. The happy privilege led him to form as high an opinion of Mr. Bell in one position as in the other, with a particular admiration of his kindness to the junior members of the profession. In his eyes Bell compared in all respects, favourably, to other teachers and masters, save and except Monro Secundus, who seems to have won golden admiration from cotemporaries of all classes. Another good quality related of Benjamin Bell was that, although admirably stored with information, he always, in conversation, appeared to be the learner, even when he was communicating information, in this respect carrying out the recommendation of Alexander Pope:—

"Men should be taught as though you taught them not,
And things unknown be told as things forgot."

In the most pressing parts of his work he was never in a hurry.

A little incident, which may be most appropriately introduced here, connects Benjamin Bell with the present generation and with an Edinburgh representative man of light and leading in our profession. Benjamin Bell had a favourite brother named Joseph, whom he hoped one day to have with him as a partner in his practice. It was not to be. Joseph Bell went abroad, and died about the year 1786. In the same year Benjamin Bell had born to him his youngest son, who at first received the name of Thomas. On the news arriving of the death of brother Joseph the name of this child was changed to that of Joseph. Joseph Bell, after being a pupil of Blizard, Astley Cooper, and Abernethy, became, in his turn, a surgeon in Edinburgh, almost as distinguished as his father. Joseph Bell died in 1848 of fever contracted in the discharge of his professional duties, leaving amongst other children Benjamin Bell, author of the Life of his famous namesake, a man much beloved, and the father of the present Dr. Joseph Bell of Melville Crescent, Edinburgh, of whom, if I could but speak as I would, I should indeed be happy, although no word of mine could add to the appreciation in which he is held as one of whom any of his forefathers might truly, if he could have forecast, have declared, *Omnes omnia bona dicere, et laudare fortunas meas, qui gnatum haberem tali ingenio præditum.*

THE SYSTEM OF SURGERY.

With the exception of two or three essays on matters extraneous to medicine, the reputation of Benjamin Bell, as an author, rests on his six volumes entitled *A System of Surgery*. These volumes were published one after another, each volume being fairly complete in itself, although in one, as appears in the edition before me, the subject at the close of the third volume—Diseases of the Eyes—extends into the fourth. The plan of the work was contemplated by its author in his early life, at the time, as we have already seen, when he met with the accident which held him so long a prisoner at Liberton. In this period he sketched out the work, taking, as I infer from the preface of the first volume, the *System of Surgery* published by Heister in 1739—a work which he considered was the most systematic up to his time—for his model.

Volume I., dedicated to Dr. Alexander Monro, bears date November 1792. The design is given by the author in the following terms:—"To exhibit a view of the art of surgery as it is at present practised by the most expert surgeons in Europe, as far at least as my own observation, in the course of attending different hospitals, joined to the advantages of reading and correspondence, have enabled me so to do."

Although called a *System of Surgery* there is admittedly no kind of classification or methodised arrangement of the subjects under consideration; the reason for this absence of arrangement being that disorders of every kind requiring the assistance of the operative part of surgery are perfectly local, and unconnected with one another by means of symptoms common to each other; and because it seldom happens that there is much similarity in the means necessary for the removal of such diseases. "The parade of classification under such circumstances, although it may serve to display the fancies of an author, can have no effect either in rendering the study of surgery more easy, or the practice of it more attainable."

The subject-matter of the first volume is on sutures; ligature of arteries and other means employed, by art, for putting a stop to hæmorrhages; blood-letting, to which subject eighty-nine pages are devoted; aneurisms, hernias, hydrocele, hæmatocoele, varicocele, sarcocele or scirrhus testicle, and, lastly, diseases of the penis.

The second volume, published in 1784, with a dedication "To Alexander Wood, Esq., Surgeon in Edinburgh," is on stone; incontinence of urine; suppression of urine; obstructions in the urethra;

fistula in perineo; hæmorrhoids; condylomatous excrescences and similar affections of the anus; prolapsus ani; imperforate anus; fistula in ano; paracentesis of the abdomen; paracentesis of the thorax; bronchotomy; œsophagotomy; and amputation of cancerous mammæ. In the introduction to this volume it is explained that the execution of it was delayed by the circumstance that the author had been engaged in publishing a third edition of a treatise on ulcers, inflammation, and white swelling—a treatise which must have commanded a large amount of attention in order to call for a third edition.

The third volume, dedicated to the managers of the Royal Infirmary of Edinburgh, commences with the study of affections of the brain from violence, a subject which extends through 243 pages in six sections. It is followed by a chapter of eighteen sections on Disease of the Eyes, the volume closing with this chapter on the 469th page. The different affections of the eyeball demanding surgical treatment are discussed at great length, and a comparative view is tendered of the respective advantages and disadvantages of the operation of couching and of extraction of cataract.

Volume IV., without a dedication, was published in 1787. It opens with a new section on Diseases of the Eyes. It had not been the intention of the author to treat again on this subject, but a foreign oculist, M. Jean François Pellier, having appeared in this country, where he quickly acquired great reputation, Mr. Bell considered it a necessary addition to this part of his work to extend the chapter on eye diseases so as to include such parts of M. Pellier's practice as appeared to be of importance. Pellier divided cataracts into three varieties: (*a*) The curable, known by the pupil retaining its natural power of contracting or dilating in full perfection, the patient being at the same time able to distinguish the light of a candle or of any other luminous body, and even bright colours, such as red and green; (*b*) The mixed or doubtful cataract, "attended with feeble contraction and dilatation of the pupil, where the patient can scarcely distinguish light from darkness, along with an opacity of the crystalline," which state is supposed to be attended with an affection of the retina or of some other part of the eyeball; (*c*) The false or incurable cataract, where, with an opaque state of the lens, there is a diseased state of the pupil, which remains always immovable to whatever degree of light it may be exposed, the patient at the same time being unable to distinguish between the most brilliant light and

perfect darkness. These, with many other observations of Pellier, are introduced and accompanied by methods of operating which are held to present various novelties of detail and management. This additional chapter is followed by chapters on diseases of the nose and fauces; diseases of the lips; diseases of the mouth; diseases of the ear, and operations practised on them; wry neck; diseases of the nipples; issues; and inoculating for the small-pox.

Volume V., also without a dedication, appeared in 1788, and is devoted to wounds of different parts of the body; followed by chapters on burns and tumours. It is curious to observe, in the chapter on tumours, how much more widely the term "tumour" was applied a century ago than it is now. Thus erysipelas is set down as an acute inflammatory tumour; lumbar abscess is ranked as a tumour; and even sprains and contusions come under the same head. In short, the one idea of "swelling" furnishes the idea of the word "tumour," whatever may be its cause or its nature.

Volume VI., the last of the series, was published in May 1788, without a dedication, but with a preface. The author now declares the *System of Surgery* completed, as he had undertaken to write it originally. It had, he tells us, met with a reception more favourable than he had expected, and more flattering than it seemed to him to merit. He will, however, so he promises, insert in every new edition "whatever improvement future experience may add to the stock of chirurgical knowledge." In this last volume he discusses: fractures of various kinds; luxations; distorted limbs; distortions of the spine; amputations; removal of the ends of bones in diseases of the joints; preventing or diminishing pain in chirurgical operations; midwifery, including the Cæsarian operation; division of the symphysis pubis; the opening of dead bodies; embalming; and bandages.

The *System of Surgery* was published by Charles Elliot in Edinburgh. and on the title page bears his initials, C. E. In London it was published by Elliot and Kay, 332, Strand, and by G. G. J. & J. Robinson. The price of each volume, in boards, was six shillings and sixpence. The work throughout is well illustrated with copper plates.

THE SCOPE AND CHARACTER OF THE WORK.

The late Sir Benjamin Brodie, in his Autobiography, was rather severe in his criticism on the *System of Surgery*. He describes it

as an "unreadable production." The criticism was not just. The work is not, it must be admitted, marked by elegance of style—the author knew that himself; but to say that it is not readable is quite away from the fact. It is a work characterised by perfect clearness; not a description, not a direction in it, that cannot easily be followed. More than that, it *was* followed, which is the best proof of all of its clearness; for men of the past, slow though they might be, were not so stupid as to purchase seven editions of a work at six shillings and sixpence a volume, if it had not been very clear and instructive. In point of fact, it was a good, sound, practical book for its day and generation, and, without serious paradox, was the more systematic because it was not systematised. It followed the system of nature without the slightest attempt to classify artificially, and it asserted itself so little that without considerable study of books preceding it it cannot be said how far it was or was not original. We may suppose that it did not contain any such striking discovery as would affect the critical mind of Brodie; and we may also suppose that much it once taught had in Brodie's time become absorbed into such common general knowledge as to seem commonplace to him. But Bell was a man who compared what he read with what he observed, and so blended the two that the two labours became, in his mind, one. My estimate of him is that he was not enthusiastic in matters surgical or medical, but was marvellously conscientious, and as marvellously industrious. If he had had his own way, or if, by fate, he had found his own way, the way which would have suited him best and in which his genius would have moved in its true sphere, he would have taken place amongst the great if not the greatest of his compeers. But that sphere was not the sphere of medicine or surgery. He was thrown into the medical sphere, and, like a plain, honest, upright man, he laboured in it to the highest pitch of his ability in that direction of labour. His true sphere was that of philosophy and political economy. He belonged, naturally, to the school of his friend Adam Smith, rather than of Monro, Cullen, or Black.

With this impression on the mind, it is fair, at the same time, to state that in surgery Bell was often far-seeing, if not original. In proof of this let three instances be submitted.

(1) When he is treating of paracentesis abdominis, he treats also on the value of tapping the intestines when they are largely distended with gas. For this operation he suggests the use of a small trocar, with which to make the puncture. The effect produced on

the breathing by "tympanites" is, he says, nearly the same as that from accumulation of water in the abdominal cavity; but the swelling is much more tense, and gives to the touch the sensation of a bladder distended with air. In such cases, when the oppression is very considerable, and danger is imminent, no doubt should be entertained of the propriety of discharging the gas as soon as it is found to be productive of great distress. And this may easily be done, in the manner directed for ascites, if care be taken to use a trocar of the smallest size, and to employ pressure in the same guarded manner as when the swelling has been produced by the accumulation of water.

(2) In speaking of amputation he is most particular in insisting on the practice of saving as much skin as will thoroughly cover the wounded surface and help to exclude the air from the interior of the wound. Belloste had already proclaimed, in the most explicit form, the success of healing wounds by the exclusion of air; and Bell seems to have been alive to the vital importance of the same practice. "Save skin," was his watchword, "and in all amputations give abundance of flap, for by this the surgeon will do most towards securing the good result of healing by the first intention." To secure this object, in amputating in the lower third of the thigh Bell cut a long anterior flap, almost precisely after the operation since performed, with so much recognition and proper favour, by the late Mr. Teale at Leeds.

(3) It is due to Benjamin Bell to say that he was one of the first in this later era to study the introduction of methods for the prevention or diminution of pain in surgical operations. "To be able," he remarks, "to alleviate the misery of those who are about to submit to dangerous operations must afford the highest gratification to every practitioner; and, as pain is the most dreadful part of every operation, it necessarily demands our most serious attention." He then proceeds to state that pain may be lessened in different ways: "by diminishing the sensibility of the system; by compressing the nerves which supply the parts upon which the operation is to be performed; and by narcotics, of which nothing answers with such certainty and effect as opium." He had an objection to the administration of narcotics in such large doses as to prevent or diminish pain, because they produce sickness and vomiting; but towards the local method of causing insensibility, by compression of the nerves, he was much inclined. He had observed that patients undergoing amputation frequently desire

FIG. 1 .

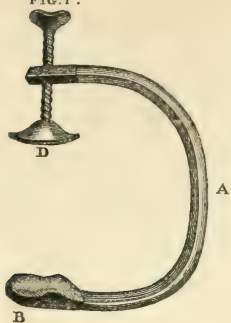


FIG. 2 .

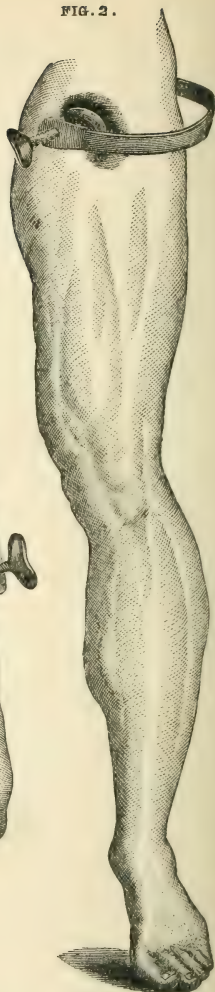
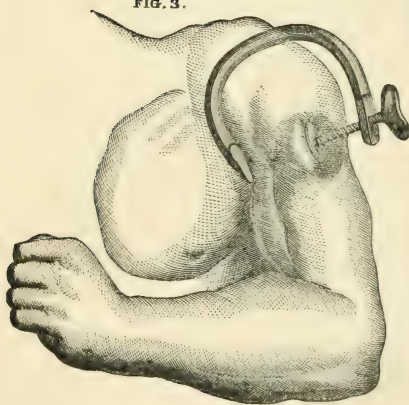


FIG. 3 .



J. MOORE'S METHOD.

the tourniquet to be firmly screwed; and he supplies a drawing, of which I reproduce a copy, of an instrument proposed by Mr. James Moore of London for compressing the principal nerves so completely as to render the parts beneath altogether insensible. All that this instrument seemed to require to render it perfect was, he thought, the power of compressing the nerves of a limb without affecting the veins; for as it is found that the nerves must be compressed for a considerable time, at least an hour, before the parts are rendered altogether insensible, the veins could not be compressed for such a length of time but with the risk of bursting. To meet this difficulty Moore proposed opening a vein; but Bell suggested a better plan—namely, compression of the artery, so as not to permit the veins to be distended.

MISCELLANEOUS ESSAYS.

There are many other medical and surgical essays of Bell on which I might profitably rest. In the first volume of the *Medical Commentaries*, edited so ably by Dr. Andrew Wood, he reports a case of obstinate epilepsy considerably relieved by the use of flowers of zinc. This was in 1773; four years later he published his treatise on *The Theory and Management of Ulcers, and on White Swellings, accompanied with a Dissertation on the Chirurgical Treatment of Inflammation* the work being dedicated to Mr. Percival Pott. In this work he insisted on the practice of opening large abscesses without the admission of air, giving the credit of the suggestion and of the practice to Mr. James Rae, who introduced the method with the most marked success in the Royal Infirmary of Edinburgh in the year 1747. In respect to the treatment of malignant tumours, he taught the good practice of early operations for their removal by the knife, on the ground that at their commencement they may be considered as local affections. Two works also came from his industrious pen, on the subjects of virulent Gonorrhœa and Lues Venerea or Syphilis. Here he enforced the view that the poisons of these diseases are different in character, and that the diseases themselves are specifically distinct—a view not only original and largely independent in his time, but opposed to the opinions of no less an authority than John Hunter. He wrote also very correctly and clearly on the subject of strictures of the urethra, dividing such strictures into spasmodic and organic, and combating and correcting successfully a then current error,

that strictures are due to venereal ulceration in the urethra, and that the administration of mercury until the body is brought under the mercurial influence is essential for their cure. In his practice he instituted mechanical means for the cure of stricture by dilatation with bougies, with, if necessary, counter-irritation by means of a blister to the perinæum—methods we in this day have not much improved upon. In speaking of syphilis, he opposed Mr. Hunter's theory, that no two diseases can exist in the constitution at the same time, and adduced in proof of his argument the co-existence of syphilis both with scrofula and scurvy. On the whole, I think we may give to Benjamin Bell the credit of defining for the first time, demonstrably, the distinction between gonorrhœa and syphilis; of having shown that gonorrhœa could be treated successfully without the use of mercury; and of having pointed out that while gonorrhœa leaves no constitutional taint after recovery from it, syphilis may leave the most decisive constitutional taint transmissible from one generation to another. He was skilful, too, in the diagnosis of chronic syphilitic affections simulating other local affections. Called to operate on a gentleman supposed to be suffering from malignant disease of the testicle, he detected the specific rash on the body, withheld the use of the knife, and treated with mercury—a remedy in which he had so much confidence that he said of it, "We are more certain of curing this disease, syphilis, with mercury than of removing any other disease by any remedy whatever." He employed mercury by fumigation when it was desirable to affect both the seat of the local disease and the system with rapidity and promptitude; but his favourite method of administration was by inunction of a drachm and a half to two drachms of the ointment twice per day. If there were any local symptoms he had the inunction applied to the locally affected part; if there were none, he had it applied at any point of the cutaneous surface, changing the spot each time.

In the treatment of ulcers of the lower extremities Bell used the spiral bandage as the best mode of treatment; he tied hæmorrhoids with the double ligature; and, as his illustrations indicate, he used the best instruments that could be produced in his day for all his operative work. In brief, he was a sound surgeon, and the more his works are studied the more they impress the mind. There is enough in them to make one good volume of surgery acceptable and even useful to the wants of the présent hour.

OUR SANITARIAN AND ECONOMIST.

Hitherto we have studied Benjamin Bell as the surgeon and busy practitioner of the healing art. Before we leave him we are bound to look upon him in another light, namely, as an advanced sanitarian and economist. In 1783 he commenced to publish essays of the utmost importance on national topics, as on the *Taxation of Income*, *The National Debt*, *The Funds and the Sale of the Land Tax*, *The Improvement of Agriculture*, and *The Scarcity of Provisions and Dearth*. These essays, collected in 1802, ought all to be republished, for they are the historic bases of many of the greatest social reforms of our time. He first proposed in these essays, in a memorial sent to the Government in 1783, the taking of the census, together with a survey of the whole kingdom; the quantity of corn sown annually, and the number of horses, with other information useful to the political economist. He made a vigorous protest against the window tax, explaining that the imposition of this insane assessment was fraught with the utmost danger to the health of the people; and he offered many suggestions for the improvement of agriculture, including facts in favour of the early sowing of wheat, that is to say, in the month of September, a plan he had adopted with advantage in the year 1778.

But the grandest political economic idea of Bell had relation to the Corn Laws. He was the first pronounced Corn Law reformer. To the poet Ebenezer Elliott, to Cobden, Bright, and Sir Robert Peel we assign the credit of the powerful advocacy of these beneficent laws; but which of them ever spoke more wisely on the folly of the old statutes and the value of a projected new law than this pioneer of a new era of food supply for the people? "Let every statute be repealed that has hitherto been continued against dealers in corn and other provisions; let all who deal in them be protected, and permitted to purchase and sell in all situations and circumstances, and whenever they may think proper. When this shall happen—and the period is not probably distant—it will soon become matter of surprise and wonder that any of these pernicious statutes were continued till the nineteenth century. They will be considered as the more remarkable from being kept in force by the people of Britain, who have long been convinced of the utility of freedom of trade in every other article, and hereafter will be spoken of in the same manner with all statutes that authorise persecution, where full liberty should be given."

FINALE.

I must not linger longer over the work of this wise and far-seeing surgeon. He gained universal respect; he won the honours of the Fellowship of the Royal Society of Edinburgh and of the College of Surgeons of Ireland as well as Edinburgh, and maybe other honours fell to him of which there is no record. His love for agricultural pursuits never left him, and he fostered them whilst still in practice. He had an estate of five hundred acres near Melrose Abbey, and he bought the greater part of a suburb of Edinburgh called Newington, where he had a house, in which he lived during the latter part of his life. He seems never to have completely recovered from the accident he sustained in the commencement of his career; and as his fame increased he felt prematurely the labour of travel on professional errands. Long before he was fifty years of age he began to fail in strength, and, accompanied by his wife and one of his sons, he commenced to visit, for long periods, the southern coast of England. In 1804 he was in Edinburgh doing a little professional work, and he held on until 1806, when he proposed a journey to Cheltenham and Bath, which was never accomplished, although the carriage came to the door to bear him away. His weakness increased, with inability to take food. "I was praying, Dr. Gregory," he replied to a question put to him by Dr. James Gregory, who heard him talking as he entered his room, "I was praying that you might all be forgiven for pressing a poor man to eat when he is totally unable." He died at Newington House on April 5th, 1806, in his fifty-seventh year.

To the practice of the Edinburgh School of Medicine Benjamin Bell added firmness and solidity. The father of its Surgical School, he stands forth a typical figure in a professional sense. The sage and prophet of some of the most remarkable of the political reforms that have occurred between his time and our own, he stands forth as one whom all classes of the nation may esteem; a man of lasting name and fame.

John Hunter and the School of Hunterian Medicine

IN British surgery the name of John Hunter eclipses every other individual name, and to a certain extent all names put together. It is a name that stands out alone, and that actually bears idolatry without being injured. Year by year, on Hunter's natal day, some surgical voice shakes the air in his praise, now in strains of worship that are intelligible; then unintelligible, in so far as the man is concerned, as if he were a god shrouded in mystery, and had only to be reverentially mentioned, or used as a peg for the orator to hang his own thoughts on—for richer, for poorer—in relation to some current professional topic, commonplace or otherwise, which may be standing out as the talk of the passing day. How his perturbed spirit, if it should linger still about the Museum he founded, takes to these annual forms of idolisation, who shall tell? In his wild-oat days—for under the title of "Jack" Hunter he was, for a few years, a great sower of that particular grain—he swore roundly, and indeed never got out of the habit to the last of his days. What, now, if his perturbed spirit, under sore temptation, should break forth during an oration and express its mind! One would like to see the consternation, with the idol at large and giving tongue.

AT HOME IN LONDON.

To get at the man and not the idol let us go back in history one hundred years, say to New Year's Day, 1791. Let us locate ourselves in London, and proceed to Leicester Fields—now known as Leicester Square. On the east side of the square, at No. 28, we shall reach the house of Hunter: a house, we shall find, measuring about twenty-eight feet of frontage, with premises running back to Castle Street; a house of four stories, with four windows on each

floor, and a side door on the left hand ; a good roomy house, in a fine central position, and behind it the famous Museum, not very long removed from Jermyn Street, and already the grand natural history collection of the world. As the time of our supposed visit is in midwinter, the chances are that all the Hunter family will be in



THE HOUSE, LEICESTER SQUARE.

residence in this house. There will be Anne Hunter, the beautiful wife, sister of Everard Home, and daughter of Surgeon Home, formerly of Burgoyne's Regiment of Light Horse ; John Hunter, Junior—"little John," and Agnes his sister ; two children out of four, two others having died during childhood. Mrs. Hunter has been married to the great man, her husband, nearly nineteen years, but retains her beauty, for which she has long been remarkable, and

which, doubtless, won the heart of her spouse, since silver and gold she had none ; a fact which prudent brother William Hunter did not particularly relish. To her beauty Mrs. Hunter adds industry ; she is a queen of industry. To industry she adds genius, genius for poetry of no mean order ; she writes words for the canzonets of Haydn, and some songs, one of which, beginning—

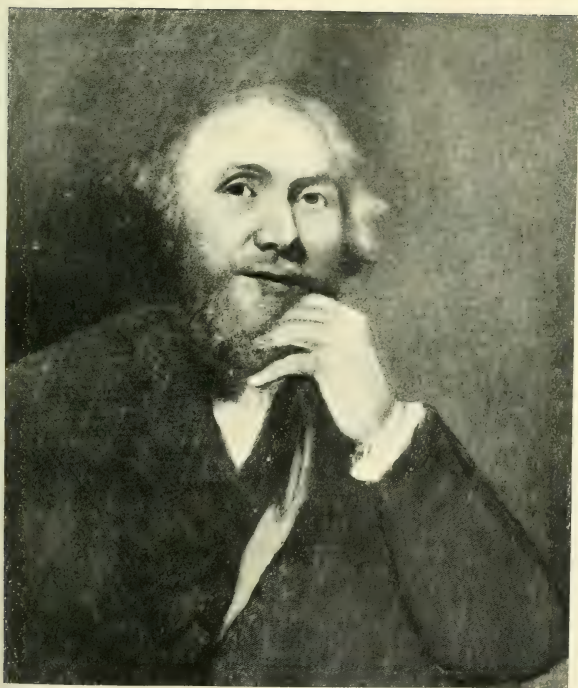
“My mother bids me bind my hair,”

takes its place among the classics, and promises to continue to hold its place, perhaps as long as the writings of the master of the Museum themselves. Lastly, Mrs. Hunter is a woman of fashion, a leader of society, who has what John, her husband, calls “kick-ups,” sometimes even on Sunday night. John himself views these kick-ups with pleasure or displeasure, according to his humour. Sometimes his house apprentice, William Clift, will have to stay to witness, with sleep-laden eyes, the hour when the master, no longer able to dictate, will issue from his study on the ground floor, during one of Mrs. Hunter’s reception nights, to seek his much-needed repose, and, with difficulty, meeting the social stream on the staircase, will stop to extend a kindly greeting to the beauty of the year, give a smart reply to the passing joke of the man of fashion, or a more serious response to the question of an administrator. At other times he will not be so complaisant. One night, coming home fagged and weary, to discover his drawing-room filled with “musical professors, connoisseurs, and other idlers,” whom Mrs. Hunter has assembled, he will go into one of his passions, and address the astonished guests with a bit of his mind. “I knew nothing of this kick-up, and I ought to have been informed of it beforehand ; but as I have now returned home to study I hope the present company will retire.” Whereupon, as Drewry Ottley says, “Exeunt Omnes.”

We may form some idea of the man himself from these particulars. An abrupt man, in manner sharp and impetuous ; a man who stands no nonsense, and who makes all about him subservient to his work. Wife, friends, pupils, servants, even to the coachman, must, *volens volens*, help him in the scientific work of his life ; and, though it may shorten his life, he will have his way. As to the man corporeally, he is of middle height, of strong frame, but with high shoulders ; his countenance firm, and yet not forbidding ; his forehead well formed, his eyes small, and of light blue tint, with eyebrows large ; his cheekbones high, his lips strong ; his moustache and beard rugged

and scanty ; his locks, of reddish tint once, now grey, thin, and carelessly trimmed ; his dress good but careless ; in face, figure, and style, forsooth, a workman throughout ; which word "workman" explains the man better than any other, for a workman he is, if ever there were one in all time. By work he has won everything he has and possesses. He has gathered round him a few friends who are devoted to him, but with his profession at large he is not what is called popular. The masses of the profession do not understand him ; never dream of him as a man who may one day find entrance into Westminster Abbey and have an oration spoken in his honour regularly each year. The courtly people, moreover, seem to have him little in view, and without any doubt think far more of the beautiful and accomplished Anne, with her kick-ups, than of John with his wet anatomical preparations, his dry bones, his books, and his bad tempers. Yet, in spite of every obstacle, he has won his way by work, earns a fair professional income, and, not caring for such an event, but holding that "no man ever was a great man who wanted to be one," has done enough to make his name immortal. In a word, he is irrepressible, and thinks only of work. Now and then he may go to his club for an evening, or to the theatre to see Mrs. Siddons ; nay, he may take part in a dance, or entertain a party of congenial friends, merrily, at the dinner-table ; but these escapades mark an occasion not often to be repeated, and a wonder when they are known to his house apprentices and the other members of his circle, all of whom have to go as fast as a vehement man, who hates butter-fingered people, reckons up time moment by moment, has no mercy for loiterers, expects to be obeyed the instant he has given his commands, and breaks out occasionally into such storms of passion that he feels they may bring his life to an instant termination, can drive them.

At this date the life of John Hunter, though it is merely a life of sixty-two years, hangs on a thread, and he knows the fact right well. His heart is all wrong. He has seizures of what the learned are beginning to call *angina pectoris*. In the seizures he feels as if his body were reduced in size, and he suffers acutely. In spite of this he holds on at his labours, multifarious as they are, without hesitation, pause, or admission of fatigue. He has tried repose for short periods, and found it irksome. He has tried change of air for some weeks at Bath, and that, too, is irksome. So he keeps at his work, and never admits he is weary of it. He begins his work early. "Come to me as early as you can," he says to a



John Hunter

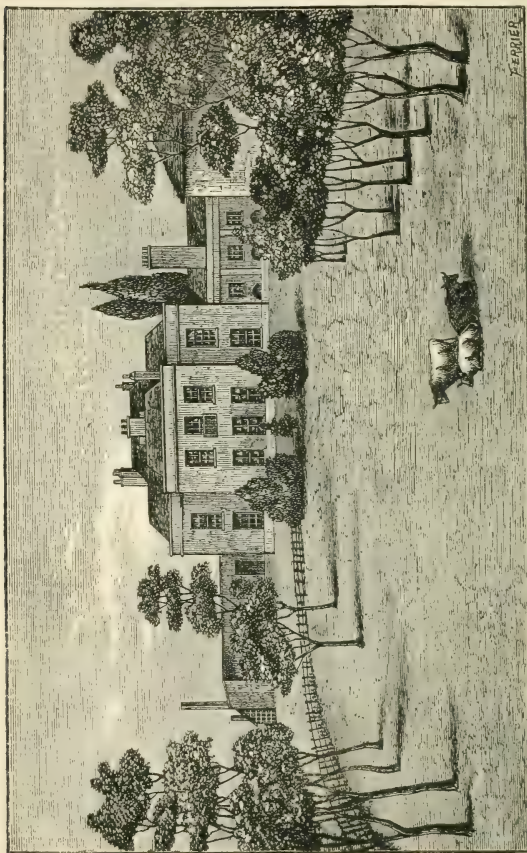
From a portrait by Sir Joshua Reynolds, in the possession of the Society of Apothecaries, London.

visitor who desires to see the Museum. The visitor, taking him at his word, goes at five in the morning, and there meets the master ready to receive him. After two or three hours' work in the early morning, breakfast is quickly taken at nine o'clock, and the professional labours commence. Long morning consultation practice at home is not the fashion at this period. The carriage comes to the door at eleven, and, with a copy of his engagements in hand, off he starts, leaving the original list of engagements behind him for reference, if he should, in the meantime, be wanted. His engagements will include private attendances, consultations, hospital practice at St. George's, lectures, and other duties, all carried out with such order and regularity that let him who dare interrupt them, even for a moment. Poor Surgeon Cline, a warm Hunterian, knows this fact to his cost. Cline has arranged for Hunter to see a patient with him after midday, but during his rounds in the morning makes, thoughtlessly, another appointment for him with another patient later on. When, therefore, the first consultation is over, Cline mentions the second, to bring down on his unfortunate head a storm of rage and fury which astounds him. Of course he has his excuses and apologies, and at last succeeds in bringing the infuriated man of order to say, "Come along, then, let us go and see our patient."

At four in the afternoon Mr. Hunter is back to dinner; and let there be no mistake about it, dinner must be ready and on the table at that hour. Whether he be at home or not, dinner must be on the table at four. After dinner he has a sleep, which is to him a wonderful restorative; and the sleep over, the delightful hours come when he holds his communion with Nature, in the face of her works collected from all parts of the world by every hand that can be pressed into the service, and with printer and printing press at hand, on the premises, ready to fix every good observation. Interruption in these hours is heart-breaking. "Well, Lynn" (to an assistant), "I must go and earn this damned guinea, or I shall be sure to want it to-morrow."

The incident throws another light on the character of Hunter in regard to money and his own pecuniary resources. He has no care for money whatever, except in so far as it helps him to pursue his scientific work, and to add to the science of the world. Born poor, and earning everything for himself, he has lived, so to speak, and not to speak disrespectfully, in a luxurious way, from hand to mouth; for although his income is large, and he is a good pay-master, the

cost of the Museum keeps him always close run, and so poor that



HUNTER'S HOUSE AT EARL'S COURT, KENSINGTON; FROM THE MEADOW, 1764-93.
After a sketch of the period.

if he should die Mrs. Hunter would be, to speak the plain truth, in needy circumstances. Nor is this wonderful, considering that the

Museum from first to last has cost its founder no less a sum than seventy thousand pounds.

The Museum at the back of the house in Leicester Fields is the best-beloved home of John Hunter. Here, with his artist-assistant Bell, whose pen and pencil are alike facile, with Home, Lynn, Clift, and his few other favourite pupils, he falls into those abstracted moods when all his parts—body, mind, and spirit—are, with one intent, employed in unravelling the deep and subtle and yet doubtless simple problems which lie before him. Beddoes, usually just, is too hard in judgment when he says: "John Hunter fancies that what he cannot find words for is very profound. He is mistaken; whenever he finds himself at a loss for words he is labouring with the delivery of nothing." Beddoes errs on this point. John Hunter, discoursing to his students in class in his Museum, is no orator, is little gifted with power of exposition, is sometimes coarse in his language, is apt to show that he is poorly read, and now and again is led to speak in self-originality which to him is truly original, but which has been said before; all passing faults, some of those spots on the sun which Mrs. Hunter recognised and admitted. But he never "delivers himself of nothing." With all his faults, whenever he is at work in his Museum he is teasing out Nature, and, with hands as skilful as laborious, is fixing her designs, for the benefit of future generations.

AT HOME IN HIS COUNTRY BOX.

We are now a little acquainted with John Hunter at home in Leicester Fields, but to know more of him we must follow him out of London into what he calls his "country Box," situated at Earl's Court, Kensington. It is a pleasant hour's drive across country from Leicester Fields to this quiet and secluded suburb. The road will skirt Hyde Park, will run through Knightsbridge, and along a good path to the Court. "The Box" stands in its own grounds, a little garden in front of it, a large meadow behind, as shown in the accompanying drawing. We enter by the meadow through two large gates swinging from sturdy pillars of brick in the Queen Anne style, and crossed by an arch, also of brick. The meadow is quite an expanse, with rows of trees on each side, and with the house not precisely in the centre, but lying rather to the left hand. A broad drive leads round by the right hand to the front door of the house: a pretty box in every sense of the word. Suppose it be now midsummer instead of midwinter, the Hunter family will have migrated to this nook out of

town. Little John and Agnes will have their playgrounds here, and Anne, their mother, will have her days to herself, while her imperious lord and master is doing his London work, going out to it early and coming home early, again to work ; for be assured Earl's Court House is no bower of idleness, or anything of that sort. Mrs. Hunter has made the house beautiful. She has decorated it partly in the Egyptian style, then a prevailing fashion or taste, which the visitor cannot fail to admire. Her own boudoir is a perfect picture, the panel of every door a little gem, a coloured sketch on a white enamelled ground. The ceiling of the drawing-room is richly ornamented with strange figures of strange birds, which husband John must have laughed at, but never dared to classify ; while on



THE HOUSE AS STANDING IN 1886. FROM THE MEADOW.

movable panels on the walls are exquisite water-coloured sketches of the story of Cupid and Psyche. The gardens outside are rich also in colours of birds and fruits and flowers. All this and much more is according to the fine taste of the poetess wife, the Eve of the garden in the artistic sense ; but her Adam is more than half owner, and for his purposes the place has anything but a paradisiacal appearance, unless we accept that all the creatures there are tame, and that the leopards and the lambs lie down together : a supposition not sustained by the facts presented to the world at Earl's Court ; for Hunter's gardens here are zoological gardens—gardens in which he rambles at night studying the ways and manners of the varied forms of life in every possible modification of such life, from the smallest to the grandest types of it. At the top of the meadow is the lions' den, shaped as shown in the annexed sketch, a round, very

strong mound of earth, with a small turreted top, the earth resting upon an arched structure, and within the vault, as it may be called, room for two lions, perhaps three. The gardener will tell us some strange and yet true stories about his master and the wild beasts and the tame beasts. He will relate that one evening, as the master came into the meadow by the large gates, there was a cry from the house, warning him that one of the lions had broken loose, and was wandering about the meadow; and that the master, taking no heed of danger, whipped his handkerchief out of his pocket, and marching boldly up to the lion, flipped the beast back into the den and securely shut it in. The same servant will tell us of another incident. He will relate that one evening, there



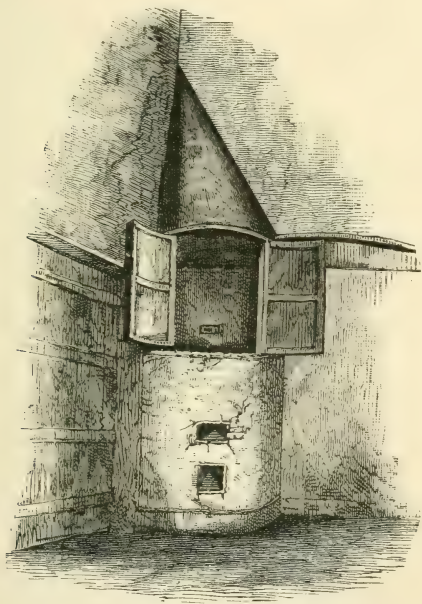
THE LIONS' HOUSE AS STANDING IN 1886.

being a great noise and dog-barking heard in one of the yards, Mr. Hunter was called out of the house, to discover two leopards loosened from their chains, fiercely contesting with the dogs; that the master rushed into the yard, and seizing each leopard by its collar, one with one hand, the other with the other, dragged the wild animals into their lairs, shut them up, and then, when the excitement had subsided, fainted clean away. He may further state that one day he found his master wrestling with a young bull, which had been received as a present from the Queen, and that but for his (the gardener's) own fortunate intervention the master would have been gored to death. Perchance he might add one more story, rather gruesome in its way and in these more refined days better left untold.

If now we cross the grounds from the lions' den towards the right-hand corner of the house and to an out-building there situated, we shall find, in a quiet recess, a copper, of which the annexed sketch is a faithful representation. The copper, we shall learn, is the cauldron in which the body of a giant, the Irish O'Brien, was boiled down, in order that the Hunterian Museum might have the skeleton. Possibly, the manner in which the skeleton was obtained will be told to us. How the young giant, being near his death from phthisis pulmonalis and alcohol, was aware that Mr. Hunter was after his body, and, to avoid that fate, left sufficient money to pay a posse of his countrymen to convey his remains to the Nore, and cast them into the sea, at a sufficient distance to prevent them being reclaimed; how Hunter, after O'Brien's death, found out and bribed the undertaker with a round sum of £500; how that worthy official, accompanying the procession, led the way to an inn, where the door being too small to admit the coffin containing the remains, he had the coffin carried to a barn, and deposited there for a brief interval of rest, after a weary walk on a sweltering day; how the barn door was carefully locked, and the key of it safely deposited in the pocket of the captain of the escort; how the bearers with their captain and friends went into the inn to be right royally entertained by the kind undertaker; how, ere the entertainment had scarcely commenced, some men, concealed in the barn, removed the giant from his coffin, and exchanged him for paving stones of the same weight as his body, and hid the body in the straw with themselves; how the faithful but innocent Irishmen, after refreshing their inner men, were brought back by the undertaker to their bearers' task, and, never dreaming of the trick played upon them, marched on stage by stage, carrying their precious burden of stones towards the sea, into which they solemnly consigned it; how the undertaker, discovering he had forgotten something at the house where the exchange of stones for the giant had been effected, went back, got the body into a spring-cart, brought it to town, and in the night deposited it in the Museum at Castle Street; how Hunter carried it away from the Museum in his own chariot to Earl's Court; and how, there dismembering it, he boiled it down in the copper, and collecting the bones, much darkened by the haste and process of boiling, put them leisurely together into skeleton form, and held his peace on the subject for five years.

Finally, in the course of our visit at this country Box, we shall be sure to see the bees that are undergoing observation; the hedgehogs, some of which have come from Edward Jenner, of Berkeley, in

Gloucestershire, an old and very favourite pupil of the master ; a considerable number of specimens preparing for transmission to the Museum ; some living animals tended with great care, in order that they may yield good evidence as to the mode of growth of the long bones of their limbs ; some deer, the antlers of which are under study ;



THE COPPER, AS STILL STANDING IN 1886.

some cocks, whose combs have been frozen to death and restored to life ; sundry skeletons of various animals in course of fitting up for their place in the Museum ; some curious instruments of research, including specially many newly constructed and valuable thermometers for determining animal heat and the ranges of it in different classes of animals ; some arrangements for trying the process of incubation ; some rare plants growing under close observation in respect to

conditions of slow and rapid growth ; and, in various positions, here and there, mounds under which, if we were to turn up the soil, we should find animal remains, especially bones counted as refuse, not good enough for the Museum.

In and amongst all these evidences of research and of untiring labour our philosopher, in the spring, summer, and autumn evenings, is at home. Company may occasionally drop in, for Mistress "Anny" could not live without company ; but that interferes little with the musings of a mind which is its own kingdom, and which, knowing that its mortal days are sharply numbered, grows day by day more determinate to make the most of every fleeting hour.

Suppose, after this, we leave Earl's Court and attend the master to the hospital and the lecture-room. There we shall see him as the teacher, practical as well as theoretical. With manner and speech of him we shall not be entranced, for he is a bad expositor by speech, and does not attract more than twenty-five to thirty students at most. When he first began, it is said he, in gentle joke, begged the porter to let down the skeleton, that he might say "Gentlemen." In spite of his defects, in spite of his use of terms not always choicely selected, we find ourselves bound to listen to him, and feel, Dr. Beddoes notwithstanding, that we are in the presence of an extraordinary teacher, one who thinks for himself, and one who thinks beyond other men on all subjects which he lays claim to as his own. What we are most struck with is his comprehensiveness ; with him medicine is the same as all science connected with life. Animal heat is a single problem to be studied as much from a beehive as from the body of a man. Animal motion is all on one plan ; there may be details of secondary powers, of leverage, and such-like, but the primary is the same in all : there is only one primary animal motor. Moreover, and above all, we discover in this strange man an earnestness, an acquisitiveness for natural objects, a grasp of understanding of natural objects, which is phenomenal. He has no time for any study of men's devices. Not a moment ! "They once tried to cram Latin and Greek into him ; but he crushed their little plans like this"—motioning an action which is better conceived than described—"and they did not try it a second time." This, as a skit at scholarly brother William, is told with gusto, as if to indicate that William did not know John quite completely.

Such is our man as we, in description drawn from fact, may read him even now—John Hunter at home in London and in his country

Box at Earl's Court.* Let us now turn to this master, so as to trace him, in rapid sketch, from his birth onwards, through his various stages of development to the point where we have met with him during the height of his living fame.

BIRTH AND COURSE OF LIFE.

The life-history of John Hunter is not one requiring a long story. He was born on February 14th, in the year 1728, at Long Calderwood, in the parish of Kilbride, East Lanarkshire. Kilbride is about eight miles from Glasgow, and I recall it, from my student days, as a place noted for its annual cattle shows, at one of which I remember visiting it in 1846, and trying, ineffectually, to make out where Long Calderwood was situated, for I had been doing some amateur carpentry in a shop in Glasgow, with the intention of making a new apparatus for reducing dislocation of the shoulder, and the owner of the shop had told me it was the "very place whar the famous John Hunter had tried his prentice han' at a wee bit o' cabinet work when he was a youngster." How I missed the house I cannot say, for it was a good stone-built Lanarkshire farm dwelling, as Sir William Ferguson's drawings of it, presented to the College of Surgeons in 1867, testify.

* The descriptions I have drawn of places are from the places themselves. I have lately visited the house and Museum buildings in Leicester Square; and Earl's Court House—long the residence of my late friend, Dr. Gardner Hill, of non-restraint celebrity—was, for many years, as familiar to me as my own dwelling, with the lions' den still in its grounds, the copper, and with relics of bones in the garden, a few of which, by the way, Dr. Hill gave to me, after they had been turned up during some alterations, instead of letting them go to the refuse cart. Mrs. Hunter's boudoir and drawing-room remained just as I have described them, up to the time when the house, itself little changed, was pulled down in 1886-7. Two of the anecdotes I have also from direct evidence; for in the year 1850 my most valued friend, the late Dr. Robert Willis, of Barnes, took me to Kensington to see the son of Mr. Hunter's gardener, a lad ten years of age at the time of Hunter's death, who remembered Mr. Hunter quite well, and was at Earl's Court at the moment when the encounter with the lion took place in the meadow. The account of the mode in which the Irish giant was removed to Earl's Court was told me by my old and illustrious friend Sir Richard Owen, who had it from Mr. Clift; a fact I mention specially because the story differs from that of Mr. Drewry Ottley and other biographers. The sketches of Earl's Court House, of the lions' den, and of the copper, were drawn for *Nature*, shortly before their demolition, by my son Bertram Richardson; and the sketch of the house in Leicester Square, as it now stands, is from the pencil of the same artist, engraved, together with the view of Earl's Court in Hunter's day, by my good friend Mr. Charles A. Ferrier, F.L.S.

The father of John Hunter was a small farmer, living on an estate which had come down to him through the Hunters of Hunterston, from the time of Robert the Second of Scotland. His mother was the daughter of Mr. Paul, the treasurer of the city of Glasgow, and probably, from his name, of Semitic descent. There were ten children in the family, five of whom only, James, William, John, Dorothea, and Agnes, lived to grow up. Of these James, the eldest, took first to the law as a profession, but left it for physic, in which profession he promised to excel, but died of consumption before he had time to distinguish himself. William we have already had before us as the renowned founder of the Hunterian Museum, now at Glasgow. Dorothea married Professor James Baillie, and gave birth to the famous Dr. Baillie, author of the classical *Morbid Anatomy*, and to the distinguished authoress Joanna Baillie. Agnes was married to a Mr. Buchanan, a cabinet maker in Glasgow; a happy-go-lucky sort of man, not a man of business habits, but convivial, unsuccessful, and short-lived.

John Hunter, ten years the junior of William, lost his father whilst still in boyhood, and from that time grew up a spoiled country boy, caring nothing for books, and wandering about the country side pretty much as he willed. I cannot find anything satisfactory about his going to school anywhere, but he must have got some rudiments of learning, for he wrote a plain hand, though he was not particularly good at the art of spelling. He was fond of country sports, and in them acquired a great deal that was of service to him in after life in relation to the study of plants and animals. When he was seventeen he went to Glasgow to live with his sister Agnes, Mrs. Buchanan; and it is said that he learned to assist her husband, the cabinet maker, whose negligence was leading him to the wrong road of life. It is now that Hunter, as it is assumed, worked in the shop to which I referred a few passages above. He remained with Mr. Buchanan between two and three years, but as that gentleman's prospects did not improve, and probably because work at a mere mechanical calling did not suit the genius of a youth of John Hunter's tastes, he, John, determined upon going up to London to join his brother William, already making his way, by rapid strides, to distinction as a teacher of anatomy and practitioner of medicine. Some of John's admirers have expressed the view that their master had laid hold of his brother James's books on physic and surgical instruments left in Long Calderwood, and that in this way he was inspired into medicine. There is not a tittle of evidence

on this subject, and the probabilities are far greater that a love of new scenery and of a new pursuit in a higher sphere of action were the true incentives to the course pursued. Whatever might be the cause of the change, John Hunter, in his twenty-first year, set out on horseback from Glasgow to London, took a fortnight over the journey, with a friend of the family, Mr. Hamilton, as his companion, and entering the metropolis in the middle of September—1748—was ready to commence his studies in the month of October at his brother's dissecting-room, under the direction of the favourite demonstrator and assistant, Mr. Symonds. According to custom—a custom still not dead—Hunter was first put to dissect the muscles of the upper extremity, a task he performed so dexterously that soon afterwards he was directed to dissect out the arteries of the upper extremity in an injected specimen. Again he succeeded so well that his critical brother foretold in him an anatomist who would never want employment.

During the following summer session John Hunter, through the influence of his brother, was permitted to attend the hospital at Chelsea, under the instruction of the famous Cheselden, who, in a kind of retirement from the severer labours of practice, was surgeon to this Chelsea establishment. Here for two sessions—1749–1750—Hunter pursued his surgical studies with one of the most illustrious surgeons of his age. Unfortunately illness soon forced Cheselden to retire altogether, and on this event the pupil was transferred from Chelsea Hospital to Bartholomew's, to become surgeon's pupil to another surgeon little less famous, Percival Pott. He attended at Bartholomew's during the summer of 1751, and, occasionally, during the next winter; but in 1752 he returned to Scotland to fetch his sister, Mrs. Buchanan, by this time a widow, to London. A new stage in Hunter's progress now occurred. He went to Oxford, and entered as a Gentleman Commoner at St. Mary's Hall. Some mystery has been thrown about this matter, but really there is no occasion for any mystery. It is clear that classical brother William was at the bottom of it, found the money, and pressed the learning. John had lived with him, had sat at his bachelor's table, where the accomplished and wealthy were also accustomed to sit, and the uncouth Scotch boy had shown that he did not shine as a scholar. William, acting on the idea that manners make the man, urged the rough youth to undergo a term of University life, and perhaps, at the same time, hoped to remove him from a circle of acquaintances amongst whom he passed as "Jack" Hunter, and with whom he

frequented the shilling galleries of the theatres to hoot and stamp and hiss at the players whenever an excitement was desired. The University plan, however, did not succeed: Hunter rebelled, and in a very unceremonious manner told Sir Anthony Carlisle, in his later days, how he crushed the design. He was not going to have Latin and Greek thrust down his throat, not he! They wanted to make an old woman of him! But they didn't.

He came back to London, and entering as a pupil at St. George's Hospital, on the surgical side, in the year 1754, became attached to that institution, as it turned out, for the whole of his life. In 1756 he served as house surgeon to St. George's, and, still assisting his brother in the dissecting-room, learned practice in the wards of the hospital, and gained *kudos* also there.

At this period, when he was twenty-six years of age, a serious event took place in his career: he fell out with his brother William. The story of this quarrel was laid in jealousy—jealousy on both sides, and differently explained by each. John claimed that from observing an injected specimen of the veins and arteries of the uterus, made by Dr. Mackenzie, a pupil of Dr. Smellie, he discovered the mode of the connection between the placenta and the uterus, and communicated the discovery to his brother, who first laughed at the idea and then adopted it as his own. William, on his side, claimed the discovery, or original observation, as entirely his own, and accepted his brother John's assistance as not more than the assistance rendered by a junior in whom he confided. The dispute, as we shall see, led to a correspondence between the brothers and the Royal Society, but neither gained a victory, and the rights of the disagreement remain still unsettled. In 1862 I heard two scholars quarrel upon the subject as ardently as the Hunters themselves might have done at the time when the angry feeling between them was at its height.

Notwithstanding this dispute, the brothers continued for a time to work together, and, in fact, John entered into a kind of partnership with William in professorial labours. They laboured well, John with the scalpel, William with tongue and pen, weapons with which John was not good; fought the Edinburgh Monros on the discovery of the functions of the lymphatics; accused Pott of cribbing from them his views of the nature of congenital hernia; and made some new researches, in which John put forth opinions, that have not held water, against the veins acting as absorbents.

Work in the dissecting-room and in experiment was continued by

Hunter until 1759, when bad health compelled him to leave London and take rest, or, more correctly speaking, change, abroad. His brother James had died of phthisis, and it was feared that he might follow in the same way; he obtained, therefore, a staff-surgeon's appointment from Adair, the Inspector-General of Hospitals, and in 1761 went out under General Hodgson and Commodore Keppel to the famous siege of Belleisle, on the western coast of France. After this event, he accompanied the troops to Portugal and Spain, during which time, though engaged in campaigning, he managed to commence some studies in natural history, in order to determine if digestion goes on in snakes and lizards during the months when they lie in the torpid condition. Of his character as a staff-surgeon we have no information, except from a rival cotemporary, one Jesse Foot, who speaks of him as contentious, and as delighting in exciting jealousies amongst colleagues. We have seen that Hunter was fond of making an occasional disturbance at the theatre, and he may have excited a little quarrel now and then, just sufficient to have afforded Foot some pretext for his colourings; but as Foot was anxious to be reckoned as a rival of Hunter in after life, it is essential to take all he has said with the customary grain of salt, and without any sense of surprise that Hunter made no reply to his denunciations.

In 1763 Hunter returned to London, the war having ended, and at once settled himself down to work on his own account. It is probable that he would have taken this independent course even if he had had the opportunity of rejoining his brother; but that opportunity was not offered him, for, during his absence, his place had been filled up by William Hewson, whose name is still familiar with medical scholars. Hewson was a fine teacher, a hard-working and conscientious anatomist, an original explorer, and one in whom William Hunter had every confidence. So it happened that in 1764 the brothers Hunter had two schools, William's school in Jernyn Street, and John's in his own house not far away—perchance in the same street. The school of John consisted of pupils whom he took to live with him, and from whom he received five hundred guineas as an apprenticeship fee; but very few others joined his class, for he was a poor lecturer, and never won the popular ear either in or out of the profession. In like manner he was for a long time unfortunate in practice. He laboured under many disqualifications for practice. He was rough in manner, and in speech delivered himself in a style that was unpleasant to ears polite. The old name of "Jack" Hunter stuck to him pertinaciously, while, conscious of his

genius, he carried himself amongst his richer and more fortunate compeers with what Drewry Ottley calls that "pride of port," a pride which is often keenly offensive, and which makes even amiable men of genius, to say nothing of rough ones like Hunter, objectionable to those with whom they have to associate. In this there is nothing wonderful, for genius has, of necessity, its own way of dealing with a world over which, though it lie at its feet, it may have no immediate control, and from which it may receive no immediate recognition.

It is only just to say of Hunter that, with all his roughness, he carried a pure independence; he never truckled for advancement, never sought favours, and was at all times more ready to give than to receive. He knew no tricks of trade in professional work. If patients came to him he gave them his best attention, and there the matter ended; he was not obliged to them for coming, and he laid no snare to bring them back again. Such a man must needs wait for practice long and wearily, and may consider himself fortunate if he get any at all. Hunter did wait, and, after a time, practice came to him to the tune of about six thousand guineas a year; a goodly income, but one which, in his case, went to the advancement of science, to the development of medicine, and to the foundation of the incomparable treasures which now lie stored in the Royal College of Surgeons in Lincoln's Inn Fields.

Very soon after he had settled down into practice he bought or took the "Box" at Earl's Court as a convenient place for study, and a kind of feeding-house for the Museum; he obtained permission to have the refusal of all the show animals dying in the Tower, and he made free use of opportunities to possess the animals which, in those days, were carried round the country for the fairs and feasts as favourite shows. He conceived now the grand idea of comprehending the whole kingdom of life; of contrasting and comparing one field of living things with the whole, and the parts of the whole with each other, so as to make Nature his sole and indisputable mistress. His was to be a classical school, the classic of the classic in natural history, with no authority, save the one authority that has framed all, and planned all, and given to all construction and form. The grandeur of his project was not slow in its effects. Hunter the junior got more recognition than Hunter the senior amongst the leaders of the world of science, and in 1767 he was elected a Fellow of the Royal Society, an honour for which William had still to wait. He was fortunate, too, in being elected, on December 9th, 1768,

Surgeon to St. George's by a majority of one hundred and fourteen votes over forty-two obtained by his rival, Mr. D. Bayford.

In 1770 William Hunter removed his school and Museum to Windmill Street, making over the lease of his old house and school in Jermyn Street to John—another advantage. For the new school John acquired some pupils who afterwards attained wide-known names, including, amongst others, Edward Jenner, for whom he seemed to have entertained a fatherly kindness, in which affection with a fair amount of chiding and occasional snubbing blended curiously. The year following his possession of the house in Jermyn Street—namely, in July 1771—Hunter married the beautiful and accomplished Anne Home. He was married not altogether according to bachelor brother William's humour; for William had an eye to the one thing needful, and a wife who had no dowry was, to his mind, a pure mistake for a poor man, however great might be her beauty and her ability to lead and shine in society. But John had good taste; he was by nature an artist, and loved pictures above everything: how, then, could he fail to desire that the choicest picture in his home should be the most lovely? He was earning at this time about a thousand guineas a year—too little for a man to found a Museum upon and at the same time marry a wife ambitious to excel in the world of fashion. So said such friends as brother William and those of his circle.

Some years passed, during which Hunter was busily engaged in adding first to his Museum and his learning of nature, and next to his practice as a surgeon. In all he succeeded, and up to the year 1775 everything was doing well; but in the spring of this last-named year, after some mental excitement, a check of a smart kind interrupted the course of his life. He was seized suddenly with what was called spasm of the heart, during which he contrived to breathe by a voluntary effort, though, as he afterwards observed, this was probably of no service because the circulation had stopped. After a most painful paroxysm he made a quick recovery, and from then onwards, though the paroxysm was a warning, had a long respite. In 1777 he had an attack of another kind, which he described in a letter to Jenner as "a swimming of his head so that he could not raise it from the pillow for ten days," with other symptoms so serious, that on the advice of his medical friends, including the distinguished Heberden, he retired to Bath for three months, leaving Everard Home (Mrs. Hunter's brother) and Mr. Bell to make or complete a catalogue of the specimens in the Museum. This last attack was

also brought on by mental worry. He had become security for a friend for a large sum of money, and had been called upon to pay the liability at an inconvenient moment. His symptoms were, inability to raise his head from the pillow ; morbid sensibility of the organs of sense ; a feeling of being suspended in the air ; a sensation that his head and body were diminished in size ; and an idea that every motion of his body was extensive and rapid. By the time the three months' rest in Bath were over he was tired of the enforced idleness, and returning to London, recommenced his labours with improvement in health and apparently a fair recovery. In fact, he resumed his lectures, including surgical lectures at St. George's, and worked away in capital spirits as if work were play, as a letter to Jenner indicates.

Jenner, poor fellow ! always soft-hearted, had been crossed in love, and had poured out his soul to the irrepressible "dear man" John Hunter. The "dear man" replied with characteristic bluntness, but not in the best grammar : "I own I was glad when I heard you was married to a woman of fortune ; but let her go, never mind her. I shall employ you with hedgehogs, for I do not know how far I may trust mine." This was quite in character with Hunter when he was in strength, and shows that he had got back to his old power. The same evidence is repeated in an act which even his staunch adherents somewhat regretted : he sent a paper to the Royal Society in 1780, renewing his claim of having discovered the true mode of union between the uterus and the placenta, the discovery his brother had already claimed and had published in the year 1775 as his own, in his great work on the gravid uterus. It was a pity ; and, worse than all, the defence of John to the Royal Society, in answer to a dignified letter by his brother, was just wanting in that dignity which his brother had sustained ; for in his letter he suggested that if he himself did not make the supposed discovery it ought to be divided amongst a number of others. Of course the Royal Society did not permit itself to enter into a controversy between two of its Fellows on a matter entirely of personal veracity, and so the public interest in the question subsided. But the quarrel between the two chief disputants was irreconcilable ; and although, a year or two later, in the latter part of the fatal illness of William Hunter, John begged to see him, and did, for a short time, lend him his professional aid, there was no true reconciliation, and the splendid collection which the elder brother had made, and which would have been a fortune to the younger, was left away from him, together with all money and

even the family estate at Long Calderwood. That John Hunter smarted severely under this sad trial will be obvious enough to every one who thinks of the strong emotional nature of the man. Baillie, to whom the little family patrimony was bequeathed, in a truly generous spirit restored it to his aggrieved relative ; but that was not sufficient to heal a moral wound, to some extent self-inflicted, that pierced the heart.

A diversion of a serious kind, in the year 1781, led the thoughts of John Hunter away from the dispute with his brother, and caused his name to be spoken of amongst the public more than it had ever been previously. He appeared as a witness for the defence in the remarkable trial, at Warwick, of Captain Donellan, for the supposed murder of Sir Theodosius Boughton. Hunter was on the unpopular side, was sneered at by the judge, and was practically of no service to the unfortunate prisoner, who, tried on the suspicion of killing his brother-in-law, Sir Theodosius, by means of laurel water, was condemned, verbally by a kind of legal sophistry, for killing by arsenic. In the Medical Society of London we have a report in full of this trial, and reading it now we see that of scientific evidence, so called, there was none worth consideration compared with that given by Hunter ; yet his evidence went for nothing, and Donellan, "poor devil," was executed.

From 1782 the tide of practice began to flow towards Hunter, and with it came extended fame. He was elected a Fellow of the Royal Society of Belles Lettres of Gottenburg ; Croonian Lecturer of our own Royal Society ; and Member of the Royal Society of Medicine and of the Royal Academy of Surgery of Paris. We may consider him now, in fact, as in the zenith of his reputation. He was also by this time a member of the Corporation of Surgeons of London, but singularly enough seems to have troubled himself little with their affairs, and held no important office in their fraternity.

In 1783 Hunter made his great move from Jermyn Street into the house in Leicester Square, of which we have already heard. Here he was indeed at home, and here he gave a local habitation and a name to the Lyceum Medicum and to the Society for the Improvement of Medical and Chirurgical Knowledge, the *Transactions* of which are still a treasury of useful facts and observations. The Museum, under the careful hands of Everard Home, Andre, and Bell, became also gradually complete, and by 1785 may be considered to have attained perfect order. In this year he was honoured by the award of the Copley Medal from the

Royal Society, and in the early part of the year was in good health ; but in April, after some symptoms of gout, he began to suffer from spasmodic seizures of the arms, face, and stomach, and subsequently with what was again supposed to be spasms of the heart. He was also attacked with nervous oppressions, and with a dread that he would be the victim of hydrophobia, because he had made a dissection of a person who had died of that disease. His severe attacks of spasm were easily induced, and ordinary remedies failing, he was led to visit Tunbridge Wells and afterwards Bath, from which latter place, having regained much of his usual health and spirits, he returned to London in October, and resumed his active work.

Three more incidents, and this section of the history of our great man must cease. He stood as sponsor to one of Jenner's children, a responsibility accepted by him in a letter truly characteristic ;* he took part in the formation of the Veterinary College ; and he sat for his portrait to Sir Joshua Reynolds.

The original portrait from this master engraved by Sharp, and destined to become one of the household gods of physic, is in the Royal College of Surgeons ; but there was another taken by the same master, which Mrs. Hunter presented to Mr. J. Weatherall, from whom it came into the possession of Mr. Thomas Knight, a member of the Society of Apothecaries, who in turn presented it to that Society. Through the kindness of the present Master of the Company, Edwin Chabot, Esq., and the Court, I have been permitted to have an autotype taken of their portrait, as the one which to my mind is the truest because the least conventional. In this portrait we have the man in his work-a-day form ; not abstract, but real ; not thinking of what he ought to be, but what he really was ; in illustration of his own idea that no man is great who tries to be so.†

* See Life of William Jenner.

† There are other likenesses of Hunter : a profile from the life by Tossie, engraved by J. Caldwell ; two oil portraits by Edward Home, Mrs. Hunter's brother, in one of which he is shown at work in a loose coat with his hair brushed back ; and, in another, now in the Royal Society, with his hand on the head of a dog. The Royal College of Surgeons has a bust of him by Flaxman, a small medallion, and a fine engraving produced by Maguire, in 1849, and painted by Hanhart, from a pencil-drawing taken in 1793 by Sir Nathaniel Holland. Palmer published also a silhouette, and the late Mr. John Churchill picked up a plate of him by J. Kennerley. From the original portraits of Hunter many plates, busts, and statues have been produced since his time ; including the statue by Weekes in the Hunterian Museum, and the bust in Leicester Square by the sculptor-poet, or poet-sculptor—which shall it be in future history ?—Thomas Woolner.

Two offices were bestowed upon Hunter in his later years. In 1776 he was appointed Surgeon Extraordinary to the King, and ten years later he was made Deputy Surgeon General to the Army; but, on the whole, his position was not great amongst the courtly people. His practice must, I think, have been general as well as surgical, including midwifery; for Mr. John Cordy Jeaffreson has found conclusive evidence that Hunter attended Mrs. Byron at her accouchement, when her babe, afterwards the famous poet Lord Byron, was born in Holles Street, in January 1788; that a short time afterwards he gave Mrs. Byron instructions respecting the kind of shoe her child should wear on coming to need shoes; and that, in May 1791, he was consulted on the subject of the proper shoe for the well-known deformed foot with which the poet was afflicted from birth.

JOHN HUNTER AS A WORKER.

From the above outlines of the career of Hunter so far, let us turn to him briefly as a worker—to his work as an author, as an original observer, and as a practitioner.

WORK AS AN AUTHOR.

In order to arrive at an estimate of the writings of John Hunter, I have made it a point, as a student preparing for the task, to re-read carefully the Hunterian essays, through and through, from Palmer's admirable edition of 1835. Palmer was a conscientious and laborious Hunterian scholar, an erudite man, and one blessed with true common sense, by which he was guided in the sterling foot-notes he has added to his volumes.

Hunter first appeared as the author of a comprehensive work comparatively late in life, namely, in 1771, when he was forty-three years old. In this year he published his first volume, *A Treatise on the Teeth*; a treatise, it has been said, that was forced out of him in order to defray from the sale of it the expenses of his impending marriage. In 1772 he published his essay on *The Digestion of the Stomach after Death*; in 1773, *Anatomical Observations on the Torpedo*; in 1774, *Account of Some Receptacles of Air in Birds*; in 1775, *An Account of the Gymnotus Electricus*; in 1776, *Proposal for the Recovery of Persons Apparently Drowned*; in 1780, *Account of a Woman who had the Small-pox during*

Pregnancy, and who seemed to have communicated the same Disease to the Fœtus; from 1776 to 1782, *The Croonian Lectures on Muscular Action*, for which and other papers he was awarded the Copley Medal in 1785; in 1784, *Observations on the Inflammation of the Internal Coats of Veins*; in 1786, *Treatise on Venereal Disease*; in the same year, *Observations on Certain Parts of the Animal Economy*. In 1792 he wrote *A Treatise on the Blood, Inflammation, and Gun-shot Wounds*, a work dedicated to the King. This was the last, and some think the greatest, of all the Hunterian works. It is certainly the best written, although in places obscure both in thought and expression. It was not published until the year after his death.

There are many other medical essays appearing casually, such as one on *Introsusception*; another on *Paralysis of the Muscles of Deglutition Cured by an Artificial Method of Conveying Food and Medicines into the Stomach*; a third on *The Case of a Young Woman who Poisoned Herself in the First Month of Pregnancy*; and a fourth *On the Growth of Bones*. There is also a paper by Everard Home in the *Transactions of the Society for the Improvement of Medical and Chirurgical Knowledge*, describing Mr. Hunter's *Operation for the Cure of Popliteal Aneurism*, and which really belongs to the Hunterian series.

In the above list all essays and papers that relate to natural history, as distinct from medicine and surgery, are omitted; but those mentioned have been of sufficient weight for many months of study. I rise from that study, as I am sure every other student would, astounded at the quality, the magnitude, and the grasp of the author. The works are phenomenal. In them are texts for Hunterian orators for a thousand years at least. They stand for originality second to none in medicine, and although they do not contain any one concrete discovery like that of the circulation of the blood, they have in them much more that partakes of comprehension of nature in life and living action, and in compass of vital, natural law.

In the study of Hunter's writings the difficulty of completely understanding him is often perplexing. He observed so many things, held such breadth of view, and tried to compress so much into so little, that had he possessed natural or acquired skill in exposition he would have been hard to follow. It is perfectly honest to say, that easily as he gathered and treasured from nature, he was, according to ordinary ideas, an illiterate man. He composed chiefly

by dictation, and with little more appreciation of the learning of other men than he would pick up from casual conversations. He read from nature, and took no time to read from any other source. Here was his strength, here his weakness. He was in and within Nature. He was in collusion with her, and if he could have expounded her with half the facility that he could read her, Aristotle himself had been his inferior. As it was, he was like a man who has learned the language of a foreign country by living within it and associating with its people, without being able to translate the language into his native tongue. At times, in his admiration of natural acts and processes, he mistook Nature by assigning to her intentions, as if she went out of her way to do some particular thing in order to meet some particular accident or event. In this sense he speaks about healing "by the first intention," as if Nature were a surgeon called in to meet a special injury by a special design of art. He even attributed good to her when in adhesive processes she led to the most fatal injuries.

From the fertility of his mind he must, like Shakespeare, have composed with rapidity, straight off, without either blotting out, referring back, or correcting carefully; from which circumstance he often contradicts himself. Thus in his first Croonian Lecture on muscular motion he tells us that when voluntary muscles take on involuntary action they never tire. But a page or two further on he explains that muscles after work require a certain time to regain the power they have lost in action, and that by alternate motion, quick and violent, they may tire sooner than by constant action.

It is most difficult to say which of his works and observations is the best, for there abounds in every chapter such brightness of originality, that one great sentence will sometimes compensate for any number of obscure or doubtful passages. The CROONIAN LECTURES; the essays in the ANIMAL ECONOMY; Chapter II., on the VASCULAR SYSTEM, in the work on the Blood; and the essay on SYMPATHY, in the *Principles of Surgery*, are, to my view, the finest. The most unsatisfactory of his works is that on the LUES VENEREA, for here he has confounded syphilis with gonorrhœa, appears to consider all chancres as indurations, and treats upon mercury as if it were an absolute specific, and as if, by its action, it would diagnose between the specific and a non-specific affection. In criticising this treatise it is, however, necessary to remember two facts: first, that the work was supervised by four other practitioners,

namely, Blane, Fordyce, Pitcairn, and Marshall, so that he was not so absolutely responsible for it as for his other works. In the second place it must be admitted that some of the most accomplished men of our own time—take Dr. Wilks in illustration—have defended Hunter with masterly argument. Dr. Wilks' essay, *A Defence of Hunter*—if I remember correctly a title of nearly a quarter of a century ago—was a splendid effort. It commended the opening chapters of the Hunterian work; accredited Hunter with taking a correct view of syphilis as a specific constitutional disease; excused, cleverly, his apparent ignorance of the difference betwixt syphilis and gonorrhœa; explained that Hunter anticipated Rollet on the question of the *Chancre Mixte*, and defended the Hunterian treatment, contending that in that treatment two factors were proposed: (a) the radical cure, in an early stage, by destroying the chancre; and (b) the constitutional cure after the disease had itself infected the constitution.*

WORK AS AN ORIGINAL OBSERVER.

As a patient and original investigator John Hunter was one of the most laborious and comprehensive the world has ever possessed. He was always on observation. In the year 1767 he ruptured his *tendo Achillis* whilst dancing, and, wishing to test treatment, he continued to walk about with the heel raised and the muscle simply compressed with a bandage. By no voluntary act could he induce the muscles to contract when their tendon was divided, "the muscles refusing to act as if from a sense of imperfection." Afterwards he traced out the process of reunion of divided tendons in the lower animals, dividing them artificially, below the skin, with a couching needle. In the remarkable chapter on SYMPATHY, in the *Principles of Surgery*, he tells us he went to an animal magnetiser to be magnetised, rather fearing that his imagination when acted upon would lead to spasm of his vital organs; but he remembered that he could direct his attention to any part until he felt a pain in that part, and so when the magnetiser told him he would feel the magnetism first at the root of the nails of his hand nearest to the so-called "magnetic" apparatus, he directed his attention exclusively to his

* It would be very useful if Dr. Wilks would republish his essay on the defence of Hunter. Few beyond myself probably remember it now, and my recollection of it is imperfect; but I hope that in the few lines submitted I have correctly stated those parts of the argument to which reference is made.

great toe, working it about, and preventing the "magnetism" having any effect upon him.

In regard to experimental work it must be admitted that many of his experiments were rough, and that some very inconclusive ones led to incorrect inferences: as, for example, in his argument that the veins do not absorb; but when he came to anatomy and to the broad outlines of natural history; when he came to comprehensive grasp of vital phenomena, then he was equal to the best of his race. Geology (Palæontology, as it has been called since his time); Botany; Natural History; Anatomy, comparative as well as human; in all these his genius and grasp of observation could not be surpassed.

WORK AS A PRACTITIONER.

The most varied opinions have been held respecting Hunter as a practitioner of medicine and surgery. Some of his cotemporaries, following the example of those of Harvey, derided his practice, and looked upon him merely as a naturalist and enthusiastic physiologist. Others, including Astley Cooper, extolled his practical skill. The plain truth is, that his mind was rather turned from practice because that was work for a living, and took him away from the original pursuits in which his soul delighted. I confess I should not like to be subjected to the practices he carried out, and to the bleedings and dosings he thought necessary. But here we must judge him by his time, and, so judged, he stands out favourably. He often suggested common-sense rules of life, rules sound to this day. He advised Nicol, the publisher, with whom he once went halves in the purchase of a fine tiger, that if he wanted to raise a young child and not kill it, he must not try to harden it, but must bring it up with the same care for its warmth as the hen bestows on her callow brood; advice acted upon with the success it deserved. As a surgeon he was a careful if not a brilliant operator; a surgeon who looked upon an operation as the opprobrium of surgery, but who did his work well when called on by necessity. Even in regard to the abstraction of blood he was more guarded than his fellows. His diagnosis was good for its day, and his observation of phenomena of disease acute. He was bent on observing the effects of one disease on the course of another, and pointed out the fact that he even had seen *Noli me tangere* cured by the action of a fever. At the same time he missed things sometimes in a manner incomprehensible, except on the theory that his mind was too absorbed in physiological

work to be quick in seeing the practical. How else can we account for the fact that he divided the tendons of animals with a couching needle, and yet never thought of subcutaneous surgery?

The great support of his claims as a surgeon is that he suggested and practised the operation of tying an artery for aneurism at a point far above the aneurismal sac. Had he originated this operation it would have been proper to place him in the first rank as an operator. We can, however, in presence of the truth, say no more of his help in this matter than that his explanation of the reason for the operation and for its success was strictly scientific, and confirmatory of a great advance in practical surgery. In strict fact, the French surgeon, Anel, had conceived and performed the operation before John Hunter ever took it in hand. I know it is the habit of our good Gallic brethren to give us wretched Islanders little credit for originality; but this should not lead us into the temptation of making our great men greater than theirs, when the evidence is against us.

In summary, John Hunter was, by comparison, a superior practitioner of medical and surgical art; but in this work of his life he did not shine so illustriously as to stand out a burning and inextinguishable light, such as he does stand out in the physiological and natural history departments of natural knowledge.

DEATH, BURIAL, AND RE-BURIAL.

The story has often been told of Hunter's death. On October 16th, 1793, he left his house in Leicester Square in good spirits, whistling, as Mr. Clift observed, a Scottish air. He forgot his engagement list, but Clift followed him to York Street, St. James's, where the carriage was waiting. He took the list from Clift, and in an excitable tone told the coachman to drive to St. George's Hospital, where he went to meet a Board, to insist on the admission of two young students to the hospital course, who had not fulfilled a new rule of proving that they had received a regular medical training. He had previously sent round a rather rude letter on this matter; and soon after the opening of the Board meeting, and whilst he was speaking, one of the Board flatly contradicted him. Trying to suppress his uncontrollable passion, he struggled into an adjoining room, his nephew, Dr. Baillie, after him, and, falling into the arms of Dr. Robertson, died on the spot. His body was put into a chair, and, with the empty carriage following, was borne to Leicester Square.

On October 22nd, 1793, John Hunter was interred in the vaults of the Church of St. Martin's-in-the-Fields, after a *post mortem* had been made, which revealed extensive heart disease and other lesions. He had expressed a wish that his heart might be preserved, but this was neglected. A very few friends attended the obsequies. After lying in vault No. 3 under St. Martin's Church for sixty-six years the remains were removed. An Order in Council had been advertised that the vaults of the church were to be cleared. The late Frank Buckland, whom we all knew and loved as the dearest and most genial of men, read this advertisement, and, with Professor Quekett, obtained permission to see vault No. 3 opened and emptied. At the bottom of a number of coffins they found that of Hunter, in excellent preservation. The coat-of-arms on the brass plate was uninjured, and the inscription—

JOHN HUNTER,
ESQ.,
DIED OCTOBER 16TH,
1793,
AGED 64 YEARS,

was as distinct as on the day it was engraved. In the parish registry the following was also recorded :

October 22nd, 1793.
Apoplexy, M. John Hunter, Esqr., £6 10s. 2d.
Leicester Square. No Candles. $\frac{1}{4}$ past 4 o'clock.
V. N. 3. Duty 3d.

A wish was at once expressed that the remains should be taken to Westminster Abbey, and be there re-interred. To this the Dean of Westminster, Dean Stanley, gave his assent, and on Monday, March 28th, 1859, the remains were removed from St. Martin's-in-the-Fields to the Abbey, and were buried there immediately after the afternoon service. I was one of those present, and in the evening of that day wrote, for publication, the following account :

“As public notice had been given that the re-interment of John Hunter would take place in Westminster Abbey on Monday after the afternoon service, and that an appropriate anthem would be given, an unusually large congregation assembled, and great numbers of medical men attended, in addition to those who had obtained tickets at the College. There was no funeral service, but the words of the anthem during the afternoon service were, ‘When the ear

heard him, then it blessed him ; when the eye saw him, it gave witness to him. He delivered the poor that cried, the fatherless, and him that hath none to help him. His body is buried in peace ; his name liveth evermore.' While the service was proceeding the Council of the College and many gentlemen invited to join in the ceremony assembled in the Jerusalem Chamber, the room in which Henry IV. died, after having been brought there from the Confessor's shrine in the Abbey, in a fit of apoplexy ; and, the afternoon service over, the procession was thus arranged. Following the coffin, which was carried on a high bier, were the Dean of Westminster ; Mr. Baillie, a grandnephew of Hunter ; the Earl of Ducie, and Dr. Clarke of Cambridge, as Trustees of the Hunterian Museum ; Mr. Frank Buckland and Professor Owen ; the Presidents of the Colleges of Physicians and Surgeons ; the Council and Professors of the College of Surgeons ; the Censors of the College of Physicians ; the Master and Warden of the Apothecaries' Company ; the Presidents of several learned Societies ; the Medical Officers of the London and Provincial Hospitals, and many visitors. While the *Dead March in Saul* resounded from the organ the procession proceeded round the Abbey through lines of spectators, and returned to a grave opened on the north side of the nave, near the western end ; here the coffin was lowered amid a great concourse, and many present obtained then their first glimpse of it. The coffin was extremely well preserved, the grey cloth worn only in a few places. On a brass plate, with the family arms, was inscribed, '*John Hunter, Esq. Died 16th of October, 1793. Aged 64 years.*' Beneath this plate the College had had another affixed, with the inscription, '*These Remains were removed from the Church of St. Martin's-in-the-Fields by the Royal College of Surgeons of England, March 28th, 1859.*'"

In opening the grave for Hunter the bones of Ben Jonson were exposed, and a skull was freely handed about, said to be that of "Rare Ben" ; but thereby hangs a tale.

In April 1862 the Royal College of Surgeons completed their grateful duty by placing in the nave of Westminster Abbey a memorial of polished granite, inlaid and bordered with brass, bearing these words :—" *Beneath are deposited the remains of John Hunter, born at Long Calderwood, Lanarkshire, N.B., on February 14th, 1728 ; died in London on October 16th, 1793. His remains were removed from the Church of St. Martin's-in-the-Fields to this Abbey on March 28th, 1859. The Royal College of Surgeons of England have placed this*

tablet over the grave of Hunter to record their admiration of his genius as a gifted interpreter of the Divine power and wisdom that works in the laws of organic life, and their grateful veneration for his services to mankind as the Father of scientific surgery. 'O Lord, how manifold are Thy works; in wisdom hast Thou made them all.' "

So rests finally this bright representative of the great lights of the last century of mighty genius; a century that has been a bank of knowledge and wisdom, on which we of this century have lived and flourished. In our money-grubbing, fee-gulping, pedantic, hard matter-of-fact days, with their hide-bound educational formulas, he would have been nowhere. The very College where he is worshipped would pluck him like a shot, as one fit only to be sent back, old chairs to mend. Happy for him and for us that, working in freedom from the tyranny of much cramming, his immortal mind was permitted to run, without impediment, its immortal course!

William Hewson, F.R.S.

AMONGST its other treasures, the Medical Society of London possesses a famous picture painted by S. Medley, representing that quaint old Quaker physician, Dr. Lettsom, of doggerel fame, if such be fame :—

“ When people's ill they comes to I ;
I physicks, bleeds, and sweats 'em.
Sometimes they live ; sometimes they die ;
What's that to I ? I Lettsom,”—

presenting a gift to the Society. In the chair, raised above the rest of his Fellows, is Dr. Sims, the President, himself a man of learning and of antiquarian taste, to whom the Society is indebted for some presents of considerable value. Sims, as the presiding genius, wears the cocked hat ; and around him, or rather before and around him, sit the great men of his day, men whose names, figuring largely in their time, have passed now into the shades of the forgotten. Some time early in the fifties, I remember Mr. Medley, still hale in the flesh, coming down to the Society's rooms to look at his picture, which he had not seen for over half a century. The then President of the Society, John Bishop, F.R.S., with Dr. Chowne and a few others of us, met him, and heard from him as many details as a man of perhaps ninety summers could call to mind. He named some of the men who had once sat to him, but amongst all the figures on his canvas, one in the background seemed to interest him most—a fact the more peculiar because it was the picture of a bust, not of an actual figure. “ I have heard that that was a clever young man,” he said, “ who died early, before I came on the scene, but I forget his name.” The gap was filled by Mr. Bishop, who at once remembered the name “ William Hewson,” a name we all recognised, as indeed that of a clever young man, the moment it was pronounced.



William Hewson

From an engraving by H. Robinson, first published in Gulliver's "Life of Hewson."
from a mezzotint by Vandergucht.



William Hewson was, however, something more than "a clever young man." He was a man of industry, honesty, and original observation. Had he lived long enough, he might have rivalled John Hunter himself, whose cotemporary he was. There is not much to be told as to the life of William Hewson; it was a life too short and too concentrated on one object to admit of much history: but respecting the work of his life a great deal may well be said, for it was work of the highest order; work much neglected in the present day in favour of what is infinitely less true and valuable; work that cannot be put out of sight or out of memory, but will rise again and again, and declare itself in all its truth and simplicity. This also attaches to the work, that its author died at it and from it. When a soldier of mark dies in battle from a wound, we make a great deal out of the event: we signalise a hero, and write songs and essays in his honour; while we let the man of science, who may die from a wound in the battle of science, go to his grave without so much as a thought. A commonplace death, as it is conceived, but really as noble a self-sacrifice, and may be as heroic, as that of any soldier who has fallen in any field of vanquishment or victory.

In a few pages, the late Mr. George Gulliver, himself one of the broadest and most honest of surgeons, has condensed the leading facts known of our present scholar, and in his work and collection of the essays of Hewson, for the Sydenham Society, I find ready to hand most of the leading facts that can be obtained. Chiefly from Gulliver's book, therefore—which I prize the more because it is a gift from him, with one of his kindly expressions on the fly-leaf—let me sketch, in a few lines, what can be said of a biographical nature.

PERSONAL HISTORY.

Hewson was eleven years younger than John Hunter. He was born on November 14th (old style), in the year 1739. He was, so to say, born in physic, for his father was a practitioner of medicine at Hexham, in Northumberland. His mother, whose maiden name was Heron, was well connected. He was one of eleven children, all of whom, except three sisters, died before he died. After the usual preliminary education at the Grammar school at Hexham, under the Rev. Mr. Brown, he began to study medicine with his father. Then, in order to improve his knowledge, he went to Newcastle-on-Tyne, where he became the pupil of Mr. Lambert, a surgeon there of considerable repute, and, in fact, in his day, as I have learned,

the leading surgical authority in that part of England. From Mr. Lambert's practical teaching he came to London, from London he passed to Edinburgh, and from Edinburgh to Paris, adding, in the famous schools of these cities, to his stores of information, theoretical and practical. We gather these brief facts from a letter which, after his death, his widow wrote concerning him to Dr. Samuel Foart Simmons, the biographer of William Hunter. She became, she says, acquainted with him in the year 1768. She was a personal friend of the famous Benjamin Franklin, who was in London at this time, lodging in the house of her mother, Mrs. Stevenson, and her narrative is too simple and touching to be omitted. "He (Hewson) was at that time in partnership with Dr. Hunter. Some similarity in our dispositions created a mutual esteem, and the equality of our situations made our union desirable in point of prudence. I had five months the start of him in age, no pretensions to beauty, nor any splendid fortune; yet I believe he was satisfied with the choice he made. We were married July 10th, 1770. I brought him two sons. The elder was just three years old when Mr. Hewson died, which was on May 1st, 1774, and I was delivered of a daughter on August 9th following. His last moments of recollection were embittered by the idea of leaving me with three children scantily provided for. The trial of my fortitude was different: the loss of affluence I did not feel for myself, and I thought I could bring up my children not to want it. However, by the death of an aunt, who left me all her fortune, I became reinstated in easy circumstances, and enabled to give a liberal education to my children, who I hope will prove worthy of the stock from which they grew, and do honour to the name of Hewson."

Continuing her narrative, written in 1782, Mrs. Hewson adds: "Mr. Hewson's mother is still living at Hexham, and has one daughter, the youngest and only remaining child of eleven. His father died in 1767, and having had so large a family, it will be readily supposed he could not give much to his son, so that Mr. Hewson's advancement in life was owing to his own industry."

His professional studies completed, William Hewson came to London, as the centre in which he was destined to cast his lot, and was naturally attracted to the school in which William and John Hunter taught. He lived at first in John Hunter's house, commencing his studies in the autumn of the year 1759. At that period, as will be recalled by those who are conversant with the lives of the brothers Hunter, John Hunter was in precarious health, and was

advised to go abroad—advice he followed in 1761, by which time Hewson had won such favourable notice from William Hunter that he succeeded John as anatomical demonstrator in the school. As a teacher, he had talents which John Hunter had not: he seems to have been remarkably gifted in power of exposition, and he began at once to earn his living by his tutorial skill. He was not, however, content to rest on his oars: he began to study at Guy's and St. Thomas's; took out-classes in midwifery of Dr. Colin Mackenzie, and in physic of Dr. Hugh Smith. In 1761 he went to Edinburgh for further study, carrying with him letters of recommendation from Sir John Pringle and from his distinguished master, William Hunter. In the winter of 1762 he returned to London, and recommencing to teach under William Hunter, finally went into partnership with him in an anatomical school in Litchfield Street, in which street he lived and received pupils in residence. John Hunter was still abroad, and when he returned to London in 1763 he found Hewson completely installed in his place in his brother's school. The fact does not seem to have caused any bad feeling between the two younger men; and John Hunter, independently disposed towards his brother's influence and patronage, simply started a school on his own account in friendly rivalry.

The partnership of Hewson with Dr. Hunter continued into the year 1771, and during that time Hewson made great professional and scientific progress. He visited, in the summer months of 1765, France, Flanders, and Holland, and in 1768, during the holiday time, he went to the south coast, in Sussex, to make observations on fish, and prepare papers on the lymphatic systems of oviparous vertebrates. In 1769 he moved into the Windmill Street school of Dr. Hunter, where he had an apartment allotted to himself. In 1770, on March 8th, he was elected a Fellow of the Royal Society—perhaps one of the youngest Fellows who had ever been admitted—on the recommendation of the renowned Benjamin Franklin, Dr. William Hunter, Sir John Pringle, M. Maty, J. Turton, and James Ferguson; and on November 22nd of the same year he was awarded the Copley Medal for his papers on the lymphatic system in birds, amphibious animals, and fishes, and as the man who within the year 1769 had contributed most to the advancement of science and useful knowledge. At this period Dr. Benjamin Franklin was living in London, in the house of Mrs. Stevenson, a friend for whom he entertained much respect. Mrs. Stevenson possessed the daughter with whom Hewson fell in love, and whose simple and affectionate

narrative has already been told from her own pen. His marriage with her took place after she had consulted Franklin upon it, on July 10th, 1770, and proved in every way happy and suitable. The young couple first lived in a house near to that of Dr. Hunter, but the year following some disagreement took place between Dr. Hunter and Mr. Hewson, which led to a dissolution of their partnership. The cause of the separation is not definitely recorded, but we may infer that Dr. Hunter was rather impetuous in his manner, and that Hewson resented something that was said or done by him. Franklin, as a "common friend," was appealed to by both, and during an "unpleasant time" was "obliged to hear their mutual complaints." The end of it was that the partners separated; Dr. Hunter continued to carry on the Windmill Street school, and Hewson, having built for himself a lecture theatre adjoining a house in which he intended to reside, opened his classes; so that there were now two schools of anatomy branching out of William Hunter's school—the school of John Hunter, in Jermyn Street, and of William Hewson, in Craven Street, Strand.

A letter from Franklin to Dr. Hunter, in the possession of Mr. Hunter Baillie, and published by Mr. Gulliver, explains some part of the differences which led to the separation. Franklin refers to a memorandum of terms which he made between the two, dated August 23rd, 1771, in which it is stated that Dr. Hunter "expects Mr. Hewson should go on with his business as usual, during the remainder of the term they are to continue to proceed together, and during that time should make preparations at Dr. Hunter's expense, such as the Doctor should direct to be made, and others, so that those directed are not neglected nor omitted; that the preparations are to be the Doctor's sole property, and at his absolute disposal, so that if afterwards he should give any of them to any person (which he could not be understood to promise), such gift was to be considered as the sole effect of his good will." Later on Dr. Hunter presented, not to Hewson, but to Franklin, some specimens, which the latter, having no use for them, gave immediately to Hewson, believing that to be the intention of the donor. In justice to Hewson, Franklin adds "that his (Hewson's) conception of the original agreement between himself and Dr. Hunter was, that he had a right to make preparations for himself, the business and common interest of the partnership not being neglected." Here the two differed in opinion, but came to a kind of compromise, expressed in a paper which Franklin prepared and handed to both.

Before opening his new school, Hewson delivered, as a preliminary, a lecture on the uses of the spleen and thymus gland, to a number of his *confrères* in the world of science. In his succeeding lectures to students he progressed well, getting together a large class, and adding, without seeking for them, the emoluments of the surgeon to those of the professor. Of his now promising career, his friend Lettsom recorded all that was most favourable: "Genius and industry were rewarded with success, and domestic duties with felicity. The theatre in which Hewson delivered his lectures and expounded his doctrines was crowded with men of science as well as with pupils, to listen to a youth grown sage by experimental researches."

Such was William Hewson when thirty-four years of age. Whatever angry feeling had existed between him and his old and famous master William Hunter, whatever the rivalry between him and active John Hunter, all was soon quieted, and was succeeded by a mutual desire to shine together in friendly contest, and in good will the one towards the other. In plain words, a brighter outlook never befell any of our fraternity than that of Hewson: he waited only for life in order to secure a brilliant course of activity, usefulness, and honour. The picture is pleasant to contemplate; and now, whilst our minds rest on it, let us look at the outcome; let us see what this bright and youthful genius, in the few years of his active industry, accomplished for the world of medicine in which he moved and had his being.

HEWSONIAN MEDICAL PHILOSOPHY.

I speak of Hewson's work as philosophy, and, if I have read his work aright, the one word "philosophy" is the only word that faithfully describes it. Gulliver admirably analyses, annotates, and criticises the works, adding largely to the history of every subject touched upon, and I recommend every one to read carefully what he says; but he seems to me to go into too much detail of commentary and minute dissertation. I will venture to look at the Hewsonian works as unity evolved out of details, which, though they need not be ignored, are secondary compared with the result that springs from them. Some men by bare industry become great, great by the mass of evidence they pile up for other men to build upon. Other men collect but little evidence, comparatively, and yet out of that collection construct so much that what they do is of moment in spite of its smallness. These last are artists as well as workers, and Hewson

was conspicuously one of them ; conspicuously so even beyond his two great rivals, the brothers Hunter themselves.

ON PARACENTESIS THORACIS FOR AIR IN THE CHEST.

Hewson's first essay was on *The Operations for Paracentesis Thoracis for Air in the Chest ; with some Remarks on the Emphysema, and on Wounds of the Lungs in General*. The essay was written in 1766-7, and was communicated by Dr. William Hunter to "a Society of Physicians in London," from which emanated the well-known *Medical Observations and Enquiries*, referred to in previous biographies. The paper was read before this Society on June 15th, 1767, and was followed by a sharp contest between its author and the distinguished Monro Secundus, the Professor of Anatomy in the University of Edinburgh, with whom it was his (Hewson's) fate more than once to cross swords. The essay related to an improvement in surgery—namely, the operation of paracentesis thoracis in order to let the air out of the chest during emphysema caused by puncture from a fracture of the ribs, or other wound in which the lung is punctured through the pleura. From the report of a case by Mr. Cheston, and from the dissection of a person who died after injury to the chest, Hewson came to the conclusion that the accumulation of air in the pleural cavity, and the confinement of it there, may occasion the worst symptoms, and even death itself. In illustration of this fact he relates cases from M. Littre, M. Mery, Dr. Hunter, and Mr. Cheston. In three of these cases the patients died, and it seemed to Hewson that the air confined in the chest was the principal cause of the symptoms—the difficulty of breathing, the tightness of the chest, and the sense of suffocation—and as these symptoms agreed with those of hydrops pectoris and of empyema, both of which are relieved by paracentesis thoracis, he was induced to believe that an operation for letting out the air might be performed with success. In order to determine what would be the effects of compressing the lungs with air from the pleural cavity, and then relieving the compression, he performed a series of experiments on the lower animals, which supported his views. He also made a *post mortem* of a man who had died after fracture of the ribs, which confirmed his opinion more strongly than ever. The result of his researches was, that in instances where the lung is punctured, whether by fractured ribs or other causes, whenever symptoms of tightness of breathing and suffocation come on, we must assign, as the cause, air pressure from the pleural

cavity; and if upon this there be symptoms of extravasation of air into the subcutaneous cellular tissue of the body, as sometimes occurs, we ought to look upon that as a mode of relief, and either allow it free course or afford relief by puncturing the pleural cavity so as to give vent to the enclosed air. The best place for performing the operation, if the disease is on the right side, will be the fore part of the chest, between the fifth and sixth ribs; "for there the integuments are thin, and in the case of air no depending drain is required." But if the disease be on the left side, it will be more advisable to make the opening between the seventh and eighth or eighth and ninth ribs, so as to be sure of avoiding the pericardium. A small puncture would be sufficient, "as the air requires not a large vent for its discharge"; and the best manner of performing the operation is with a knife, by a cautious dissection, rather than by the "coarse and hazardous method" of thrusting in a trocar.

The publication of the above-named essay, in the third volume of the *Medical Observations and Enquiries*, led quickly to the dispute I have alluded to between Mr. Hewson and Dr. Alexander Monro. In the winter of 1761 Hewson had attended Professor Monro's classes in Edinburgh, and the Professor now accused him of having advanced views which he had heard in class, and which had been expressed, originally, there. Monro seems to have been unmeasured in his terms of impeachment, and drew thereby a reply from Hewson, which has been published in full. In the reply Hewson says that, "though he may be as covetous of fame as most people, yet he is incapable of taking any unjustifiable methods of acquiring it"; and in rather a lingering, perhaps doubtful acknowledgment, he admits, from statements made to him by other pupils who had attended Dr. Monro's lectures and had taken notes of them, that he had been anticipated, but that at the time he prepared his essay he had never heard the least hint on the subject, either from Dr. Monro or any other person. Monro, only half pleased, in declaring himself "sufficiently satisfied at having secured his title as the first who proposed that improvement," gave a rather pettish version of the whole affair, and still hinted that there was a little plagiarism after all, because a knife instead of a trocar was recommended by the younger disputant for the performance of the operation, as if the suggestion of a knife were a pretence at originality. For a moment the contention ended between the two authors, but it was never really settled between them.

WORK RELATING TO THE LYMPHATIC SYSTEM.

In 1768 Hewson commenced to publish an account of his inquiries into the lymphatic system, his first production on this subject taking the form of a letter to Dr. William Hunter on the lymphatic system in birds. This letter was communicated to the Royal Society, and appears in the *Philosophical Transactions* in 1768, vol. lviii., pp. 217-26. In the following year—1769—he sent to the same learned Society a paper on the lymphatic system in amphibious animals, and later in the year a third on the lymphatic system in fish. The papers appear in the *Philosophical Transactions* for the year 1769, vol. lix., pp. 198—203 and 204—15. His researches on the lymphatic vessels and their contents were continued until 1774, when they, with new material, culminated in a treatise of experimental inquiries, containing a *Description of the Lymphatic System in the Human Subject* and in other animals, illustrated with plates; together with observations on the lymph and the changes which it undergoes in some diseases. The second part of these inquiries bears a dedication to Dr. Benjamin Franklin, to whom its author was much indebted for many acts of kindness and attention.

The works on the lymphatic system deserve study up to the present hour, and contain plates for illustration which also remain in some respects unsurpassed. A short history of the discoveries previously made on the lymphatic system is excellently put, and is memorable as containing a just tribute to the discoveries of Asellius, discoveries which supplemented and crowned those of William Harvey, but which Harvey himself, probably owing to advancing years, and that weariness for things new which creeps on with age, was inclined to ignore. Equal justice is done to Pecquet, Rudbeck, Jolyffe, and Bartholin; to Nuck, Ruysch, Glisson, and Meckel; to William Hunter and Monro; who by their labours had explained the anatomy of the lymphatic system, and the mode in which the lymphatic fluid finds its way into the blood.

Why Hewson pursued this same line of inquiry he explains to us in simple and forcible terms. When the lymphatic vessels were first seen and traced into the thoracic duct, it was, he tells us, natural for anatomists to suspect that as the lacteals opened into the intestines to absorb, so the lymphatic vessels—which are branches of the same system—might possibly do the same office

with respect to the other parts of the body ; and accordingly Dr. Glisson, who wrote in 1654, supposes these vessels to arise from cavities, and that their use is to absorb. Frederic Hoffmann also laid down the doctrine very explicitly, that the lymphatic vessels are a system of absorbents. Later anatomists, however, took a contrary view, and from experiments, particularly such as were made by injection, concluded that the lymphatic vessels do not arise from cavities and do not absorb, but merely are continued from small arteries. Hunter and Monro controverted this opinion, and, falling back on that of Glisson and Hoffmann, endeavoured to prove that the lymphatic vessels are not continued from arteries, but are an independent system, and strictly absorbents.

It may seem strange to us in this day, and yet it is true, that anatomical investigation by the most skilful injection ever devised and practised, that of Ruysch, led to the opinion that the lymphatics run, continuously, from the arteries ; yet such was the fact, and so strong was the opinion held on the point, that the illustrious Baron Haller himself favoured it, and contended that before the lymphatics could be accepted as absorbing vessels, it must be determined whether other animals, besides man and quadrupeds, have or have not this system. Hewson saw the force of this objection, and, setting himself at work to clear it up decisively, proved the affirmative by discovering the system in birds, fish, and amphibious animals. In consequence of these discoveries, he also arrived at a knowledge of the existence of considerable varieties in the composition of those vessels through the various classes of animals ; and by comparing the knowledge thus obtained with some facts he had observed concerning the blood, he was led to ascertain, as he believed, the use of the lymphatic glands of the thymus and of the spleen ; structures "which have so long been considered the opprobria of anatomists."

An extreme and yet natural enthusiasm, which riper years might have corrected, perhaps misled Hewson at this point ; still we are bound to accredit him with much that is both original and practical in his work on the lymphatics and on the use of the lymphatic system. His anatomy is here shown to be of a high order, and his reasoning on physiological principles is equal to his knowledge of anatomy, although by necessity less solid as a foundation. We may accord to him the merit of clearly showing that the lymphatic vessels are absorbent vessels ; that the lacteal vessels and the lymphatics form parts of one system ; and that the fluid secreted

by this system is not a mere watery solution, as some before his time had supposed, but a coagulable fluid serving purposes in the economy beyond what is merely mechanical. Previous to Hewson it was surmised that the watery fluid present in the closed serous cavities is simply the condensed water which, when a cavity of an animal recently dead is laid open, escapes as vapour of water or steam; and on this matter he did not altogether differ from his predecessors. But he showed that, except in the watery fluid of the ventricles of the brain, the fluids named are coagulable; that they contain coagulable lymph; and, comparing this lymph with that found in the lymphatics, he asserted that it was of the same kind. Hence he drew the conclusion that the lymphatics, by absorbing the lymphatic fluid found in the cavities, prevent its accumulation and the establishment of that morbid condition known as dropsy. The brain is the only part exceptional to this rule; a fact he accounted for by the absence of lymphatic vessels in its structure, even in the choroid vascular network.

With much skill Hewson also indicated the process of absorption of poisonous substances by and through the lymphatics. More clearly than any predecessor, he pointed out that in a poisoned wound on the cutaneous surface, the red lines of an inflammatory character are lines of lymphatic vessels and lines of absorption. Most clearly he indicated that, in the progress of such a disease as cancer, the absorption of morbid particles from the diseased structure to the lymphatic glands demonstrates absorption of material, which, in turn, leads to induration, enlargement, and disease of the glandular structure, with dropsy in the cellular tissue of structures lying on the distal side of the glands affected. Very shrewdly he assigned to the lymphatic vessels the duty of draining the cellular tissue of its fluids; and with excellent argument he maintained that in the process of absorption an independent act is performed; that the lymphatic vessel is not a continuation of an arterial tube, as had been surmised, but is of distinct origin, whether it be considered as belonging either to the lacteal or the lymphatic system. It is perhaps not strictly fair to accredit Hewson, as some have done, with the discovery that in the thoracic duct lacteals and lymphatic vessels find their common centre, and that the final connection of the combined system is made with the veins at the point of conjunction of the thoracic duct with the left subclavian and jugular veins; but we may rightly accede that he described the courses of the absorbing vessels more distinctively than any one who had

preceded him, and that he actually traced the lymphatic fluid from the thoracic duct into the venous current, and into the right auricle of the heart.

Like the brothers Hunter, however, Hewson made probably one original mistake on absorption. In his zeal to define the true action of the lymphatic vessels, he assigned to them too much. He made them appear as the exclusive absorbents, and denied all power of direct absorption by the veins. I cannot, after the most careful reading of his essays, come to a safe conclusion whether he doubted the absorption of simple water by the veins, and I infer that he did not; but he certainly denied the absorption by veins of all alimentary elements other than water, of all plastic materials, and of all that helps to make up solid tissue or organised fluid, while he assumed to the absorbent vessels every portion of that service. In this respect we now consider him to have been wrong, but he was not without good argument for his hypothesis, and he was so just in argument, that had he seen that absorption may occur in vitalised structures where there are no lymphatics, as we have since seen, he would, without doubt, have accepted the demonstration in all good faith, with willingness of acceptance of the truth at all costs, and at all sacrifices of opinions previously expressed.

If in some way he went astray in the direction last named, he steered straight on and in the right course in another direction, from which his successors, up to our time, have widely diverged or kept away. That is to say, he studied carefully and with good promise the diseased conditions of the lymphatic and lacteal systems, and of the fluids which the lymphatic and lacteal vessels convey. He observed that in dogs in good health the lymphatic fluid always coagulates on being exposed to the air, and forms a strong jelly, and that in geese the fluid jellies sooner than it does in dogs; but that different conditions in the health of the animals make a difference in regard to coagulation. The change extends, simultaneously, in the fluids found in the serous cavities; a fact which confirmed his view that the serous fluids are identical with the lymphatic. Thus, in a dog which had subsisted for eight days on bread and water, and that sparingly, the lymph formed a very weak jelly, and in young geese the lymphatic fluid was later in gelatinising than in such as are full grown. He also observed that when the fluid in a cavity is in larger quantity than natural, the coagulation is less firm, and slower; but in other instances, where the inflammatory condition prevails, the lymph, more viscid and more rapidly

coagulable, forms, by its solidification, the layers and crusts which cover different surfaces of the body. Thus the outside of the heart and the inside of the pericardium are sometimes covered with a crust as tough as the "size" of pleuritic blood, and the surface underneath has marks of inflammation, but is not ulcerated. Probably, therefore, he infers, it is the inflammation which produces that change, or which makes the exhalant arteries secrete a lymph with such increased disposition to coagulate. Add to this that the change which inflammation seems to produce is just the opposite to that produced by a dropsy; for in dropsy the fluid is secreted with an extraordinary quantity of water and too little coagulable matter; but in inflammations the fluid is secreted with a greater proportion of coagulable matter, and with less water.

An instructive contrast, which my own early experiments on coagulation fully confirmed, was made by Hewson between the coagulation of the fibrine of the blood and of the fluid of the lymphatics. He showed that the lymph, as he calls it, of the blood coagulates, under the same conditions, more rapidly than the lymph of the lymphatics. In a dog killed whilst in health he tied the veins and lymphatic vessels immediately after death. The blood in the veins had coagulated in six hours, but the lymph in the lymphatic vessels of the neck was perfectly fluid twenty hours after death; and, being let out at that time, jellied after remaining for some time exposed to the air. In another passage he speculates on the point whether pus itself is not lymph changed in its properties by passing through inflamed vessels. In one case he found three parts of pure pus in the pericardium, without any ulcer on that membrane or on the heart. More interesting still, he was acquainted with that condition of disease to which in these days we have given the name of myxœdema. "In this condition," he says, "the cellular membrane is filled with a gelatinous fluid, which does not ooze out when the integuments are scarified, nor does it retain the impression on being pressed with the finger, as in common anasarca." This was remarkably evident in a woman who was in St. George's Hospital, and who had at the same time an obstruction of the menses, but no other symptom of ill-health. The legs in this woman were swelled, he says, to twice the ordinary size, but did not pit on being pressed by the finger.

A large amount of practical induction may be drawn from Hewson in this part of his studies. For example, in the treatment of cancer he dwells on the propriety of early operation before any gland is

affected, if the operation is to be of service. He objects to operation when the glands are involved, unless the glands can also be extirpated; and, as everything that irritates the cutaneous surface is calculated to irritate gland structure, he objects to irritants and caustics for destroying malignant cutaneous tumours. He saw, too, in some instances of poisoning by absorption, as in the absorption of variolous and venereal poisons, that the toxic matter may pass into the body without touching a gland and without causing swelling or bubo.

It is painful to reflect how slow those who have followed Hewson have been in seizing his admirable facts and suggestions on the influence of the lymphatic system in relation to disease. Of blood disease we hear plenty said, often, merely, as "words, words, words"; and of changes of the blood we hear sufficient; but how little about lymphatic diseases and changes of the fluids of the lymphatic system! Even in discussions on cancer we let the lymphatic system have the go-by, although the evidence is strong that it is the seat of the evil.

ON THE FUNCTIONS OF THE THYMUS AND THE SPLEEN.

After the death of Hewson, Magnus Falconar, another teacher of anatomy, collected and published his posthumous essays on the lymphatic glands, the thymus gland, and the spleen. Respecting the thymus, Hewson taught that as the gland is largest in the earlier periods of life, and becomes gradually less as the body advances towards maturity, so that at puberty it practically ceases to exist, the inference to be naturally drawn is that the gland is necessary for the performance of some office requisite in the foetal state, and in the early part of life, depending upon the respiration. He looked upon the gland, in fact, as no more than a large lymphatic gland, and argued that in foetal life it acts as an auxiliary to the lymphatic system, for the purpose of forming more of the central particles of the blood than could have been made by the lymphatic glands alone during the time when nature wants them most. In another place he describes the thymus as being "an appendage to the lymphatic glands, for the more perfectly and expeditiously forming the central particles of the blood in the foetus, and in the early part of life."

In regard to the spleen, the original views of Hewson on the structure and functions of that organ have been held by many up to

our own time, and are worthy still of the most thoughtful consideration. To use his own explanation, he conceived that "the spleen secretes the vesicular portion of the red particles of the blood." He was of opinion that the spleen was not really a ductless organ or gland; but that the lymphatic vessels arising from its cells are its excretory ducts, and convey the red particles of the blood into the thoracic duct, from whence they pass into the blood-vessels, and are conveyed to the different parts of the body to answer the purposes of nutrition and vivification. The thymus gland in the earlier periods of life, and the lymphatic glands in all periods of life, produce lymph particles or globules, which pass through the thoracic duct into the blood, which globules or particles he distinguished in the blood, constituting what we in our time call white corpuscles, "floating in the blood." "But nature would not make so infinitely many particles to answer no purpose! What, then," he asks, "becomes of those particles after they have mixed with the circulating blood: are they immediately destroyed? No. They are carried with the blood to the spleen; not that the spleen has any elective attraction over them, but that, being equally and uniformly diffused through the general mass of blood, a due or necessary proportion of them is received by the spleen with its arterial blood, and that the spleen has the power of separating them from the other parts of the blood, and of depositing them in the cells of that gland, where the arteries, which are spread out in the form of network upon the sides of the cells, secrete from the blood the vesicular portion, which, being thus perfectly made, is absorbed by the lymphatic vessels, which originate from the cells, and is conveyed from thence into the thoracic duct, and so into the blood-vessels." In support of this hypothesis he adduced as arguments: (*a*) That the blood from the splenic vein will not coagulate, because, as he inferred, its coagulable lymph is employed by nature in the formation of the red vesicle; (*b*) That the blood of the splenic vein contains no central particles; (*c*) That in every animal that has red blood a spleen is found, but in those animals which have not red blood a spleen is wanting; (*d*) That vast quantities of the red particles of the blood are brought from the spleen by the lymphatic vessels which originate in its substance; for which reason he calls these lymphatic vessels "the excretory ducts of the spleen."

One difficulty stood in the way of the acceptance of the above hypothesis: namely, that after the spleen has been removed from the body of a living animal, red blood corpuscles continue to be made,

The fact he accepted, and, indeed, proved from his own research. He explained the difficulty in a simple, if not conclusive, manner. He said, if we allow that the spleen makes the red part of the blood, we can still readily account for the reason why the spleen may be cut out from an animal, and yet the animal survive and suffer but little inconvenience ; because, although the office of the spleen is to form the red particles of the blood, "*yet it is not the only organ in the body capable of doing that office*" ; for he already had proved that the lymphatic vessels can, and do, produce the vesicular portion of the blood. Nature, therefore, he contended, had given the spleen as an "auxiliary to the lymphatic system, in order to the more commodiously, expeditiously, and completely forming the red part of the blood." Supposing, then, that the spleen be cut out, or its office obstructed by disease, nature has a resource, in exciting the lymphatic glands to form a larger quantity of red particles than they had ordinarily been accustomed to do : not a new office, but an old one carried into a greater activity ; a balance of activities common to other organs and functions under the pressure of necessity.

ON THE PROPERTIES OF THE BLOOD.

We have seen in these last sentences that Hewson had an original way of accounting for the formation of the red corpuscles of the blood ; we have also seen that he was acquainted with, and probably was the discoverer of, the white corpuscles. But he made other and original observations on the blood, and must, indeed, be admitted to have been one of the ablest discoverers of many facts which we accept as commonplace, but which before his time were quite unknown.

In relation to the corpuscles of the blood, as they are met with in the blood itself, he discovered much. He worked well with the microscope, preferring to use the single rather than the compound lenses, made by some of the more skilful workmen of London. The single lenses of the greatest magnifying power were those of one-fiftieth of an inch focus, which, allowing eight inches to be the focal distance of the naked eye, magnified the diameter of the object only about four hundred times. In some instances, however, he used the globules of glass which the ingenious Father de la Torr  presented to the Royal Society, one of which magnified the object six hundred and forty, the other twelve hundred and eighty times. On the whole, he preferred the single lenses of lower power, the globules

being full of clouds, made by the smoke of the lamp used in preparing them, so that the objects could only be seen through the transparent parts of the globules, which made it difficult to get a satisfactory view of the object, and gave trouble in adapting the object to the focus of the glass.

Equipped with his single lenses of the best make, and with occasional aid from the De la Torr  glass globules, Hewson worked at the red particles of the blood, and soon made the observation that, by taking the particles from fresh blood, and diluting them, not with water but with serum, he could view them distinct from each other—a convenience which led him to see that they were not globules, as had been supposed from the time of Leeuwenhoek, not spherical bodies, but “flat as a guinea.” He likewise observed that they had a dark spot in the middle, which Father de la Torr  took for a hole, but which, on careful examination, proved not to be a perforation, but, as he (Hewson) imagined, a central body. Next he made experiments by mixing the particles with a variety of fluids, and by examining them from different animals, from which he learned that their size is different in different animals; but, that, as Leeuwenhoek explained, their size does not increase with the size of the animal, but depends on some other circumstance than a difference in the size of the animal from which they are derived.

To Hewson we are indebted for the mode of separating the red corpuscles by adding to fresh blood a saline solution, like Glauber’s salts. We are also indebted to him for another method, which I have often followed, and which consists in churning up the crassamentum into the serum of blood that has been allowed to coagulate, and then, after pouring off the mixture of serum and corpuscles, allowing the corpuscles to subside. It was he who observed first that the corpuscles of freshly drawn blood are given to run together in rolls, like piles of money; that they are rendered spherical on the addition of water and of alkaline solutions; that they are separated by addition of some salts in certain proportions; that the normal salts of the blood effect their separation; that they are dissolved by weak acid solutions; that they are corrugated by solutions of alcohol and by solutions of some of the metallic salts, like sulphate of copper; and that, made spherical by water, they may be restored to their usual shape on addition of a neutral salt.

Most curious and important are experiments of another kind which Hewson made in reference to the coagulation of blood, that remarkable vital phenomenon on which up to this day dispute is

so rife, and on which so much difference of opinion remains. I remember, when working at the coagulation of the blood for the Astley Cooper prize essay, in the years 1853-4, how much I was struck by Hewson's work, and how often he came to mind when, like him, I was at the markets where animals are killed, taking notes of the conditions under which the blood of the animals slaughtered there undergoes solidification. Hewson was first to disprove the error that heat prevents coagulation and that cold favours it. He properly reversed this conclusion. He demonstrated that heat hastens the process, and that cold not only retards it, but, properly applied, suspends it altogether: a fact which supported a Lister of Hewson's day in the discovery that the blood of hybernating animals remains fluid during the cold months in which they live their drowsy lives.

He discovered, also, that some neutral salts, like Glauber's salts, on being added to freshly drawn blood, prevent coagulation; but if water be afterwards added, the coagulation will follow. He found that blood tied up in a vein would remain for a long time fluid; and he held that in the vessels of the body the coagulable part is distributed, not in the form of fibrous particles, as had been supposed, but as a true fluid, specific in its nature and distinct from the serum with which it was uniformly commingled in the blood whilst circulating through the vessels.

The active cause of coagulation he did not reveal: he seems to have stopped at the effects of exposure of coagulable blood to the air. This, it is true, did not satisfy him, but he got no further. Accustomed to bleed very frequently for diseases affecting mankind, according to the practice of his day, he came to the conclusion that the inflammatory state produced a condition of thinness of the blood which prolonged the period of coagulation after the blood was drawn, and that the blood corpuscles having time to subside, the colourless or buffy coat was left as a coat or crust on the surface of the serum and corpuscles. So, he observed, after Sydenham, that if inflammatory blood be moved by the finger whilst it is coagulating, it does not form the buffy coat, because the red colouring substance remains admixed with the whole as a red clot.

WORK AS A PRACTITIONER.

It has been customary to think of Hewson as an anatomist and physiologist merely: he was both in a remarkable degree; but he

was likewise a practitioner of keen observing power and resource. Young as he was, he had gained, some time before his death, the confidence of many patients, and had acquired a good and extensive practice. His references to what occurred in the treatment of patients is the best evidence on this point. It was often his duty to draw blood, and as often, as it would seem, it was his self-ordained duty to gather information on what he then observed, and to apply the information obtained to practical service. To take one illustration, which answers for several more : he observed that when blood is being lost, either by the lancet or from accidental hæmorrhage, the tendency for coagulation quickens as the loss of blood is continued, until at last the blood clots at the wound itself, and renders the persistent flow difficult. The observation is as truthful as it is correctly expressed, and the practical inference deduced from it is as sagacious as it is practical. He remembered a remark by Dr. Hunter, "that the faintness which comes on after hæmorrhages, instead of alarming the bystanders and making them support the patient by stimulating medicines, like spirits of harts-horn and cordials, should be looked upon as salutary ; as it seems to be the method nature takes to give the blood time to coagulate ;" and thereupon he goes to the markets and observes for himself that, in the fatal hæmorrhage produced in killing of sheep, the blood which comes first from the wound begins to coagulate in about two minutes, but later on, as the animal becomes weaker, it coagulates in less and less time, till at last, when the animal becomes very weak, the blood, though quite fluid as it flows from the vessels, has hardly been received into the cup before it is congealed. The coagulation, he observed also, of the blood last drawn is at once all through the mass, not step by step ; from which he, with Dr. Hunter, drew a conclusion in regard to the stopping of hæmorrhage, "not to rouse the patient by stimulating medicines, nor by motion ; but to let the languor or faintness continue, since it is so favourable. For in proportion as these effects are produced, the divided arteries become more capable of contracting, and the blood more readily coagulates and closes the bleeding orifices."

The brief life-work of William Hewson commenced well, went on well, ended well. The breath of enthusiasm which wafted it along, only wafted it, never carried it into the clouds. The language in which he revealed himself is pure and simple ; earnest, without being vehement ; confident, without being boastful. Opinions so novel as he ventured to advance must, he felt sure, meet with opposition,

and ought not, indeed, to be admitted till they had stood the test of the most careful and accurate examination. It might, therefore, be some time before they were universally allowed ; but, when the facts were viewed with candour, and experiments relating to them were prosecuted with industry, they would probably direct the way to discover many operations of the animal economy that were then considered among the inexplicable arcana of nature. In this spirit he submitted all he had done to the judgment of the learned reader. Twice he had a brush with Alexander Monro : once on the subject of the operation of paracentesis thoracis, once on discoveries relating to the lymphatic system ; but these contentions only add piquancy to his arguments.

THE CLOSE OF A BRILLIANT CAREER.

With touching simplicity Mrs. Hewson records the death of our brilliant scholar. On May 1st, 1774, Hewson, in the thirty-fifth year of his age, died, of what we should now call septic fever, the result of a dissection wound. He had been married a little over three years and nine months, and had two sons born to him. "A better son and husband," says Mrs. Hewson, "or a fonder father than Mr. Hewson, never existed. His manners were gentle and engaging ; his ambition was free from ostentation, his prudence was without meanness, and he was more covetous of fame than fortune." She describes him personally as slender in form, above the middle stature ; "with a good air and a pleasing countenance, expressive of the gentleness and sagacity of his mind." Gulliver was fortunate enough to find our common friend, the late Professor John Quekett, in possession of a mezzotint of Hewson, which he published in his volume for the Sydenham Society. "It was probably," he says, "the same portrait as that spoken of by Dr. Franklin, as follows, in a letter which he wrote to Mrs. Hewson from Passy, in June 1782 : 'I forget whether I ever acknowledged the receipt of the prints of Mr. Hewson. I have one of them framed in my study. I think it very like.'" The autotype forming the frontispiece of this life is from Gulliver's engraving ; the autograph is from a volume belonging to the Royal Society.

The family of William Hewson still remains. His father died at Hexham in 1767 ; his mother and three sisters survived him. His wife after his death continued to enjoy the esteemed friendship of Dr. Benjamin Franklin, and after the death of her mother in 1783

she went to Passy and stayed the winter with him. Later, on his return to America, she received a wish from Franklin that she should emigrate to Philadelphia with her children and be his neighbour. She responded, and resided in Philadelphia until 1792, when she removed to Bristol in Pennsylvania, where her eldest son William had established himself in medical practice, and with him she resided until her death, on October 14th, 1795. Her son William survived her only a few years: he died at Vera Cruz in 1802. Her daughter became Mrs. David Caldwell. Her second son, Dr. Thomas Tickell Hewson, rose to be a distinguished practitioner in Philadelphia, and was President of the College of Physicians there from April 1835 to the date of his death, in February 1848. The eighth child of this descendant was the late well-known and distinguished Dr. Addinell Hewson, of Philadelphia, who was born on November 22nd, 1828 and died on September 11th, 1889, leaving behind him, to sustain the honoured name, five children, one of whom, Dr. Addinell Hewson, has succeeded his father as a practitioner of physic in the city of brotherly love.

William Hewson Secundus is alive in Texas; and from our William Hewson, F.R.S., through each succeeding generation, one member of each generation has given to medical science either a teacher of anatomy or of surgery down to the present time: namely, T. T. Hewson (1822), anatomy; Addinell Hewson (1835), surgery; and Addinell Hewson Secundus (1879), Demonstrator of Anatomy in Jeaffreson Medical College. It is also worthy of notice that through each one of William Hewson's children, William, Thomas Tickell, and Elizabeth (Mrs. David Caldwell), there is at present a representative of medicine: Dr. David Caldwell Hewson (son of William Secundus), in Texas; Dr. Addinell Secundus (grandson of Thomas Tickell Hewson), in Philadelphia; and Dr. Thomas Hewson Bradford (grandson of Mrs. David Caldwell), in Philadelphia. Truly Hewson's descendants have fulfilled his wife's hopes: they have proved "worthy of the stock from which they grew, and do honour to the name of Hewson." *

In the whole range of medical scientific life there is not, to my knowledge, a single instance of one who in so brief a life as that of William Hewson did so much medical work so well, or made in so short a time such excellent history. He lived for scientific medicine;

* For a *Syllabus of Lectures* by W. Hewson, F.R.S., in the possession of the present Dr. Addinell Hewson, see ASCLEPIAD, Vol. VIII., Pages 299-300.

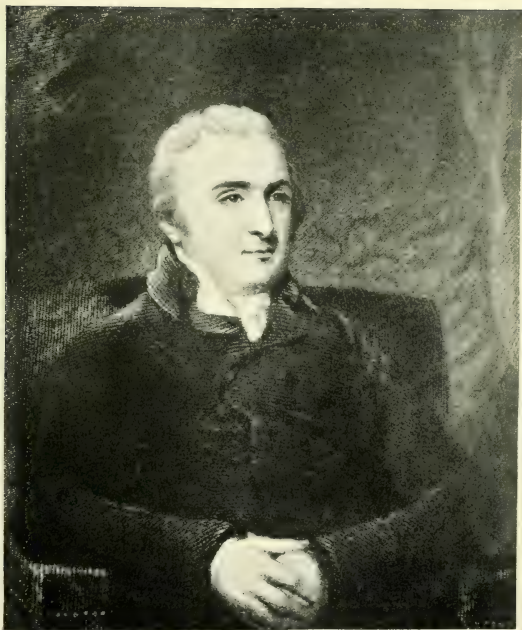
he died in her service ; and although over his grave in St. Martin's-in-the-Fields, where he was buried, possibly not far from his friend and fellow-worker John Hunter, no tomb was raised nor epitaph written, his name remains a precious name, and his works a monument, which bear on their every page the impress of genius in the bond of truth.

Matthew Baillie, M.D., F.R.S.

MR. PETTIGREW, in opening his life of Dr. Matthew Baillie, quotes a saying of the great Samuel Johnson, that a physician in a large city is "the mere plaything of fortune ; that his degree of reputation is for the most part casual ; that they who employ him know not his excellences, they that reject him know not his deficiencies." To all of which, true in this day as it was in that of the great moralist, he, the moralist, might have added that neither the successful man nor the unsuccessful has any clear idea why he is what he is. The successful man cannot place his confidence on his superior knowledge ; the unsuccessful need not place his failure on ignorance. Neither is it manner, as some suppose, nor appearance of a personal kind, that commands success ; for some of the most uncouth creatures have won their way, and assuredly some of the ugliest. The philosophers say that there is no such thing as luck, and we ought to believe them. Why, then, do some men of physic succeed in popularity, and others—their equals or superiors—not succeed ? Let us have another saying from the same sage : "Sir, it is vain to try to explain the inscrutable."

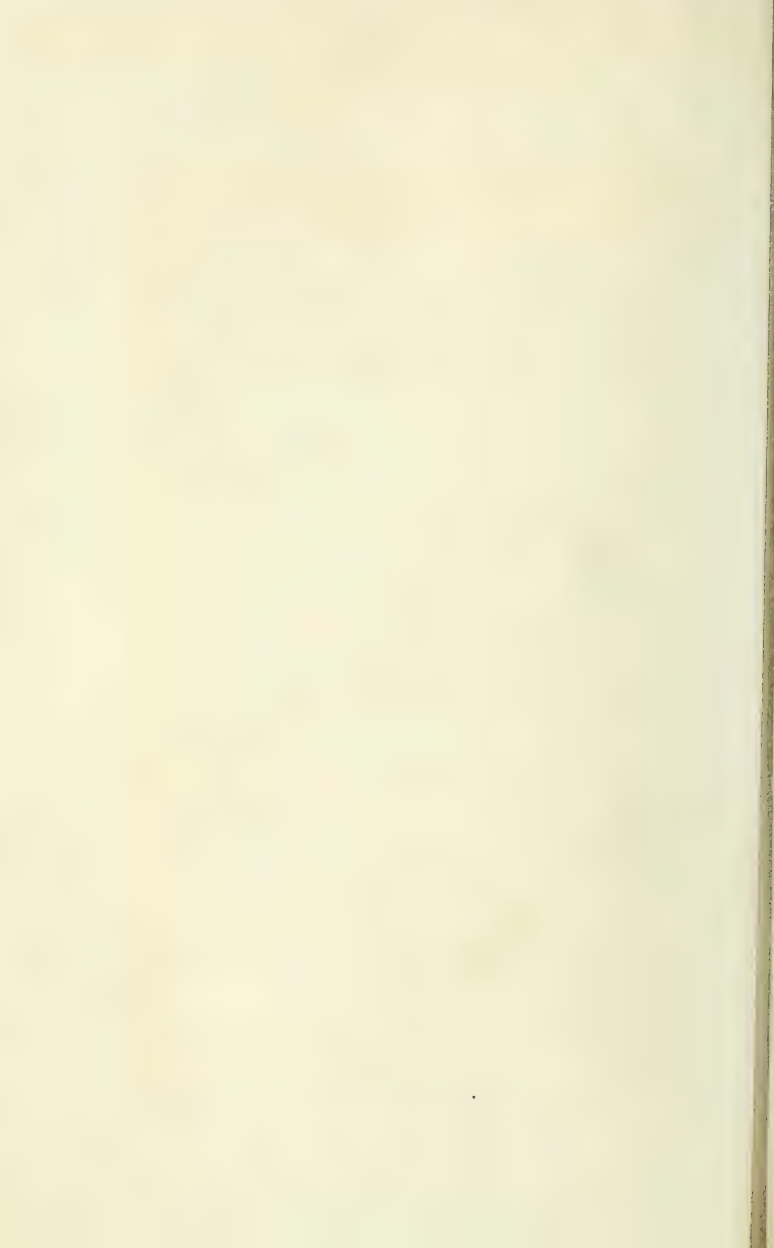
Matthew Baillie was one of those who succeeded in physic, and one of the most popular men of his day. So says his friend Pettigrew ; so says Wardrop, another of his friends and biographers ; so said often the late Robert Willis ; whilst another admiring cotemporary—Mr. John Fernandez Clarke—was so enthusiastic about his popular glory, he told me "that not only was there never such a favourite physician in London, but there never could be a second like unto him."

Matthew Baillie succeeded ? Compare him with his cotemporary, Dr. Thomas Young, who never could succeed ; he mortal, Young immortal, yet both equally learned in physic ; and again ask the reason of success and no success. Again the answer : "Sir, it is



M. Baillie

From an engraving by H. Cook, after a portrait by J. Hoppner, R.A.



vain to try to explain the inscrutable." There may be one special reason why Baillie succeeded in physic. He came in with the Hunterian tide, and because of this stroke of good fortune I put him forward here. Both William and John Hunter, of whom we have learned so much, made the way for him. They were his forerunners, his mother, Dorothea Hunter, being the sister of John and William Hunter, whom we know as having married the Rev. James Baillie, minister first of Shots, in the county of Lanark, then of Bothwell, afterwards of Hamilton, and finally Professor of Divinity in the University of Glasgow.

THE MARCH TO FAME.

Baillie was born at the manse of Shots on October 27th, 1761. He grew up under the best influences; took his education in the Grammar-school at Hamilton, and, when he had reached the proper age, went to the University of Glasgow and joined its red-robed students' corps. There he gained an Exhibition for Oxford, soon after the first sad event of his life—the death of his father. The Exhibition obtained, he lost no time in availing himself of its advantages, and on March 18th, 1779, was ready to start southwards. His uncle—William Hunter—by this time widely famous in his School of Anatomy in Windmill Street, London, was some one for the youth to rely upon; and so we find him sending off a preparatory letter to that distinguished teacher. The letter breathes a fine spirit, and could not fail to win its intention. The road to Oxford is conveniently through London, and the advice of the wise and experienced uncle will be to him of great value. What shall he do at the University? what are the manners of the place? He hears that there is a great deal of dissipation at Oxford, and he would therefore wish his uncle's warmest advice in regard to his behaviour. Then in the tenderest manner he speaks of his mother and sisters. He has prevailed on them to stay two or three days in Glasgow before his departure, that they may be diverted from reflecting too much upon it, all of them being very susceptible of impression. He would like to make the parting as light as possible, and he hopes the consideration that he is going to a person who will protect him so long as he deserves the protection, will render this far easier than otherwise it might be. "Accept," he says, in conclusion, "of everything a grateful heart can give. I must confess I am in some measure afraid to appear before you, lest my progress should seem

much inferior to what might have been expected ; but I trust much in your goodness, that you will make every reasonable allowance for these deficiencies which may appear."

If this appeal to uncle William were not sufficient, he carries with him another, which of a certainty must bear all before it. It is a brief note from the sorrowing mother to her brother : "I have furnished him out in the best manner my situation could afford. I now give him over to you. Be a father to him—you the only father he has alive. I hope you shall never be ashamed of his conduct, but that he shall obey your directions in everything."

It is curious to observe that in this motherly communication no reference is made to brother John, who by the period named was making his way into fame. William evidently was the reliable host, who was to receive the young man under his care and guide him in the right way. Perchance the story of brother John and the wild oats he sowed for a time so industriously had reached the ears of the thoughtful widow Baillie, and made her select the more trusted guardian for her son.

The Hunters were a united family, and young Baillie met with all the consideration he expected from his uncle, who, now advanced in years and unmarried, would naturally find in him a companion after his heart's desire. There was still some energy of life in the old man, a fund of story and anecdote which made him the delight of the table. He had the widest knowledge of men and things, and as a teacher was as perfect as a teacher could be. In manner he was altogether unlike his rough and impetuous brother John. He was refined, eloquent, and most prudent and careful in regard to means. Everybody said he was rich, a saying John echoed in a note with which he introduced a poor patient :—

"DEAR BROTHER—The bearer is very desirous of having your opinion. I do not know his case. He has no money, and you do not want any ; so that you are well met.

"Ever yours, JOHN HUNTER."

THE STUDENT.

Thus, in the person of William Hunter, all combined to make the introduction of nephew Baillie a stroke of good fortune, if we may not say luck ; and widow Baillie, shrewd woman, knew for the best. The nephew took. He found in William Hunter an affectionate as well as a munificent patron, and he formed in the society of Wind-

mill Street a number of important friends. We can easily receive, as strictly exact, the statement of Wardrop that his communion with uncle William was "delightful." After a sufficient residence with his uncle to make acquaintance and gain favour, Baillie proceeded to Oxford; but his connection with the University was almost nominal. There was no medical school there, and the son of a Scotch Professor in a good Scottish University, who had already gone through a full course of academical study, would not require much further instruction preliminary to an active career in anatomy and medicine. For about a year he remained in Oxford, coming up during vacation times to join his uncle in Windmill Street work, and learn his future profession; and, after one year, he left the University and returned to London for good. He acquired, however, at Oxford, a good reputation as a studious and diligent youth; one of whom his tutor, Dr. Prosser, afterwards Archdeacon of Durham, spoke with great regard. Here also he made many friendships, which were of service to him in his after career.

In Windmill Street, he went through the probationary period in anatomy necessary to become a teacher of anatomy, and he soon became a fitting successor to the master of the school. He was assiduous in his duties; accurate, and, like his uncle, ready in exposition. He had never the commanding grace and eloquence of his uncle, for he was below the middle height in stature, in which respect he was nearer to his uncle John; and he had none of the vivacity and life of language which makes a man an eloquent, as distinguished from a ready speaker; but he taught thoroughly well, and attracted so much by his powers as a demonstrator, that the school was maintained by him in all its integrity, and continued to flourish when it was entirely under his own management—an event which quickly followed, for William Hunter, full of years and honour, died three years after Baillie first came to him.

On his uncle's death, Baillie entered into the possession of considerable property. The Windmill Street school and house were left to him; all the goodwill of the school; a grand museum, now the famous Hunterian at Glasgow, for life; the estate of the family in Scotland, where the brothers Hunter were born (Long Calderwood); and the sum of £100 a year for life. Why more wealth was not left him in the form of money, was explained by the testator—"that it was his intention to leave him but little money, as he," the testator, "had derived too much pleasure from making his own fortune to deprive him of doing the same." It reflects the highest

credit on Baillie, that he gave up his possession of the estate at Long Calderwood in favour of his uncle, John Hunter, who felt severely the failure of remembrance from his elder brother. The estate itself had fallen out of the Hunter family, but had been repurchased by William Hunter.

For both his uncles Baillie entertained proper respect, and he discussed their relative merits with keen and impartial judgment. Wardrop says of them, that "William Hunter was distinguished for his talents, but John was a man of extraordinary genius." Baillie does not distinguish them quite so affirmatively. He says: "No one ever possessed more enthusiasm for the art, more persevering industry, more acuteness of investigation, more perspicuity of expression, or, indeed, a greater share of natural eloquence, than William Hunter. The mind of John Hunter was bold and inventive, travelling constantly in a path of its own, without regard to the common track which had been followed by others. This was aided by an industry and enthusiasm of which it would be difficult to find any superior example; with such singular endowments for the cultivation of science, his progress was proportionately great. There is no subject which he has considered where he has not added new light, and there are many which he has very much improved."

THE TEACHER.

In his twenty-second year, Baillie was at the head of the Windmill Street School. He associated himself, in the labour of conducting the school, with a most able coadjutor, Mr. William Cumberland Cruikshank, F.R.S. Cruikshank was sixteen years the senior of Baillie; he had succeeded Hewson as demonstrator in the Windmill Street School in 1771; had won the entire confidence of Dr. Hunter, and knew every part of the labour of a teacher of anatomy thoroughly. He also was much esteemed in practice, and to lovers of the life of Samuel Johnson will be remembered as the "sweet-blooded man" of that illustrious scholar, and his surgical attendant in his last and fatal illness. Cruikshank was a good original observer on the physiological side of anatomy, while Baillie turned more to the pathological. The two worked well and harmoniously together.

If Cruikshank had survived Baillie, the museum of William Hunter would have come to him for thirty years succeeding upon the death of Hunter; but he began at once to make numerous preparations for demonstrations of his own, by which he formed

a museum sold after his early death, in the year 1800, to the Russian Government, and removed to St. Petersburg, where parts of it, I believe, still remain. Baillie, on his side, commenced to form a pathological museum, which, in the end, he bequeathed to the Royal College of Physicians, together with a sum of £400 for keeping up the collection in good order. The specimens amounted to a thousand in number.

The position of teacher in the first school of medicine in England was an enviable one, and Baillie felt the advantages of it. His friend Wardrop, who became his biographer, says that this was the happiest season of his life ; and we may well believe it, for there is really no work so wholesome, bracing and fascinating to those who like it as that of the Professor. It brings a man into contact with those who are young of heart and hope ; it keeps foremost the knowledge of the teacher's own superiority ; it leads gently to new studies, so that the superiority may be maintained ; and it makes delightful friendships all round, with gratitude as the soundest basis of friendships that shall be enduring. In many respects, it might have been better for himself and for science if no allurements had led Baillie from his original sphere as a Professor. Whilst he continued in it he did good work, which remains behind him, to his lasting honour, in his treatises on morbid anatomy. After he left it, he became, as he himself felt, a mere drudge of the chariot and sick room, grinding the daily grind, an exhausting man, and no longer a contributor to the service he loved best.

He continued to teach almost exclusively until the year 1787, when he took up his doctor's degree at Oxford, was elected a Fellow of the Royal College of Physicians, and became one of the physicians to St. George's Hospital, the institution in which his uncle John was at that time the shining light, light with now and then an unpleasant blaze that sadly alarmed the authorities there, and cost them much anxiety. The result of these changes in his life, all tending towards practice rather than anatomy, soon had their influence : he was becoming a practitioner, and the least turn more in that direction would be sufficient to decide his fate.

THE POPULAR PHYSICIAN.

The turn came. His friend Dr. David Pitcairn, a man who had gained great distinction as a London physician, who had been a close ally of Dr. William Hunter, and who had exhibited a

marked liking for the nephew, began to feel the toils of practice irksome. Baillie thereupon commenced to relieve him of a part of his duties, and, in the end, succeeded him altogether. At first there was some difficulty in the way, for the public who could afford to pay large fees to a physician, were not easily inclined to accept a mere anatomist, however accomplished as such, in the character of a prescribing physician. The members of the profession in that day were not appreciative of the value of a profound knowledge of anatomy in a practitioner of pure physic. It was good and necessary knowledge for a surgeon, but not for practice strictly medical. It was, therefore, a nice point for our friend to determine whether he should retain the substantial income he had secured by teaching, an art which was to him most congenial, or give it up and devote all his energies to practice. The chance of making a larger income at the bedside than at the lecture table prevailed, and the chair was vacated for the chariot. Many influences in favour of the new sphere were favourable. The connection with the Hunters was naturally favourable; the patronage of Dr. Pitcairn was itself a foundation; and in a few years Baillie was at the head of the prescribing practitioners of his day. He was the physician of London, and no one of mark considered that all that could be done had been done for him in sickness unless Baillie were summoned. Fees flowed in to him like a tide, and he who originally cared, or seemed to care, nothing for filthy lucre appeared, with this flow of fortune, to be bent on nothing so much as adding to his store. He became, in short, now so accustomed to accumulate money that he accumulated as a matter of course, and worked away for dear riches as if he were working for dear life. Perhaps there were other, and it is only fair to say there were other, impulses in his heart. He was a conscientious man in work, and responded to impressions which had other origins than mere love of gain. He showed these impulses, before he entered into active practice as a physician, in an introductory lecture which he delivered on anatomy. In that discourse he taught a doctrine which even to this day has not been duly recognised, namely, that "a disease must always have a relation to a healthy action, or a healthy structure of parts, for it is only a deviation from them, so that a knowledge of disease would appear to rest on a knowledge of the body in its healthy state." Then, after pleading in favour of a knowledge of anatomy and physiology as an aid to physic as well as surgery, he added

a note which sounds well as an indication of the fine and healthy tone of his mind: "This is not a trifling matter. Justice and humanity require every exertion where the lives of our fellow-creatures are concerned. There are many professions where negligence or inattention may be reckoned as folly; but in medicine it is a crime. There is nothing that renders a person more fit for the discovery of new diseases than a knowledge of anatomy. Who can be so able as he who is familiar with the natural structure and diseased appearances in an animal body? There are diseased appearances which are common to an animal body, and which are of no great consequence. It requires a familiarity with the body to distinguish them from appearances strictly natural, or from diseases that are really serious. This last circumstance is of great importance, when we consider how often we are required to examine bodies after death, for the satisfaction of friends or for judicial inquiries. On our judgment may depend the life of a fellow-creature. What reflection can be more serious to a man of humanity? But independently of these circumstances, there will be many cases of doubt presenting themselves to our minds which we would wish to settle, but shall not be able, unless we are acquainted with natural structure and diseased appearances. Yet how is physic to be improved otherwise?"

I quote this passage as an excellent and, doubtless, truthful description, ingenuously conveyed, of the tone of mind with which Baillie entered on his practical career as a physician. The bias of his mind scientifically and morally is there set forth. He was rendered by education a student of morbid anatomy, then comparatively a new study. Bonetus and Morgagni had preceded him in this course, but their voluminous works were comparatively little known, and there was about them, and about others of lesser note in the same line, a complexity and, if I may so say, a recrudescence which embarrassed the study as well as the student. It was Baillie's task to lay the foundations of an English school of morbid anatomy, and it was well laid in his famous treatise on the subject published in 1795 and enriched, four years later, by a series of "engravings," in illustration, from the drawings of Mr. Clift, the long and much-valued curator of that Hunterian Museum to the work of which he was born, lived, and died.

Started on these foundations as a practitioner and, unfortunately for us, closing up his original labours with the close of the century in which he began to work, Baillie entered on his successful practice

with the present nineteenth century, and rose in the first fifth of it to the high popular position which has already been noticed. He moved from his residence in Windmill Street into fashionable Grosvenor Street, and being, by this time, married to Sophia, the second daughter of the distinguished Dr. Denman, he found his social position as secure as his financial. He had two children: a daughter, Elizabeth Margaret, afterwards Mrs. Robert Miligan, and a son, Mr. Robert Hunter Baillie; and, in these first days of his notable career, was one of the most enviable of men. His success made the first inroads on his happiness. Naturally of feeble constitution, the drudgery of practice told upon him with steady encroachment up to positive disablement. The profession learned to depend on him, and no man is so tried as one in this happy, unhappy state. He felt his own deficiencies most keenly of all. "I know better perhaps than another man, from my knowledge of anatomy, how to discover a disease; but when I have done so, I don't know better how to cure it." The confession, true as it was painful, seemed to influence him in the whole of his dealings with his fellow-men. Still he laboured on, as strict as John Hunter himself in the keeping of his appointments, and guided by a very clear and concise rule on the matter, which ran as follows:—

"I consider it not only a professional but a moral duty to meet punctually my professional brethren of all ranks. My equals have a right to such a mark of respect, and I would shudder at the apprehension of lessening a junior practitioner in the eyes of his patient by not keeping an appointment with him."

He was not merely considerate in regard to the order of appointments. He was anxious ever to help forward struggling practitioners with as much fairness towards them as generosity. Wardrop records a pleasing instance of this kind. "When," Wardrop says, "he (Baillie) could afford assistance directly to an individual, he cautiously avoided doing so if it was in any way to the prejudice of another. I remember being told by a person whom he thus assisted on his first entry into life, that some years afterwards, when Dr. Baillie found him fairly established, he said to him, 'You must not expect me any more to recommend you, for it now behoves me to advance the interests of those who are younger, and who stand more in need of my support.'"

There seems to have been but one opinion as to the popularity and amiability of Baillie. As a physician, a man of science, or a social companion, he shone equally. Sometimes he showed a little

irritability of temper, so that when he sat down to meals with his family he would, for a moment, bid them not speak to him ; but he soon rallied, and, coming back to his usual good-nature, would almost apologise, begging them to accept his abruptness as the mere effect of fatigue, and reassuming all his genial character after he had rested and refreshed himself. His labours were incessant, and held him from morning until late at night in continued physical and mental vibration. It mattered little how wearied or how feverish from weariness he might be, he was up and doing ; and possessed of a frame naturally feeble, he wore out rapidly. He was wanted everywhere in his sphere of action : in the wards of St. George's Hospital ; in the Royal College of Physicians, of which he was one of the Censors, elected first in 1792 and again in 1797 ; or on Commission for the inspection and licensing of houses for the reception of the insane. Whenever it was possible, also, he would be present at a scientific and social club started by Dr. Russell, one of the Physicians to St. Thomas' Hospital, and sustained by the presence of such scholars as Sir Gilbert Blane ; Sir Astley Cooper ; Mr. (afterwards Sir) Benjamin Brodie ; Sir Everard Home ; Dr. (afterwards Sir) Henry Holland ; Dr. Somerville, husband of the famous lady scholar of that name ; Dr. Roget ; the famous Dr. Wells—"dewdrop Wells," as he was commonly called—and Dr. Fordyce. Dr. Roget, in company with whom I had more than once the pleasure of dining at the house of a mutual friend, and who through his *Thesaurus* is still a treasured friend, described this club, which he well remembered, as the cradle of his literary life ; and his account of Baillie as a kind of "will-o'-the-wisp," who came in and brightened the members up for half an hour, to be off again before they had full grip of him, was very entertaining. "He was always too busy for us," Dr. Roget remarked, "and injured himself by the volume of work which he made his weak body carry on from day to day ; for he had the largest practice in London, and he neglected nothing that came in his way."

Above all the duties and pleasures named, Dr. Baillie had indeed, after a comparatively short probation, the largest practice of his day. Pettigrew estimates that his income, from practice, was over £10,000 a year, and that at a time when the one-guinea fee was considered the right thing. He must therefore have seen regularly over thirty paying patients a day, except when engaged in long country visits, of which he took comparatively few and those far between—exertion incompatible with health, and leading, of necessity, to the brief career I shall have to record.

In the midst of his so-called successful life, Baillie had an advantage, which, though "aside," as the playwrights say, was to him of moment. So soon as he became famous, his sister Joanna migrated from her and his Scottish home, made her way London-wards, and settling finally at Hampstead, resided there until her death on February 23rd, 1851, at the age of eighty-eight years. She, like her brother, gained early reputation. Her talents were devoted to poetic and dramatic literature; and although her plays, notwithstanding their tenderness, beauty, and in some instances force, did not take the popular fancy, even when Kemble and Edmund Kean gave them trial on the stage, her character and genius were widely acknowledged during her life, and reflected upon her brother a lustre which he was proud to feel and recognise.

The death of Dr. Warren added still more to the practice of Dr. Baillie, who was called upon soon after this event to attend the Duke of Gloucester, and afterwards the King, George III., the Princess Amelia, and the Princess Charlotte of Wales. It is a curious fact in regard to the King, whose mind, as it is well known, became disturbed, that Baillie considered him endowed naturally with perceptive qualities unusually acute and penetrating. Wardrop informs us that, speaking of the King, Baillie observed, "If I knew anything I wished to conceal, I would rather be cross-questioned regarding it by any barrister in England than by the King, for his questions bear so directly on those points most important for discovery, and are put in such a manner that they cannot be evaded." On another occasion he related the following anecdote:—"One day, when I waited on the King with the other medical attendants, in order to give an account of the Princess Amelia, His Majesty said to me, 'Dr. Baillie, I have a favour to ask of you, which I hope you will not refuse me: it is that you will become my Physician Extraordinary.' I bowed, and made the best acknowledgments, in words, that I could. His Majesty added, 'I thought you would not refuse me, and therefore I have given directions that your appointment shall be made out.' A few days afterwards, when we again waited on the King, he said to the other medical men, in my presence, 'I have made Dr. Baillie my Physician Extraordinary against his will, but not against his heart.'" In another instance, recorded by Wardrop, the King was advised to go to Bath, and Dr. Baillie recommended him to consult there a medical gentleman whom he named. The King immediately conjectured the country from which this gentleman came, and, after listening to all

Dr. Baillie had to say of him, added slyly, "I suppose, Dr. Baillie, he is not a Scotchman!"

Dr. Baillie had the King for a patient for ten years, and during this interval went regularly to Windsor professionally. At first this was a serious interruption to his ordinary practice, but after a while he felt it a relief. In the course of this time the honour of a baronetcy was offered him, which he did not accept. He was more than content with the honours which learned societies, like the Royal Society and the Royal College of Physicians, had conferred upon him in the commencement of his career. He was elected F.R.S. in 1789.

BAILLIE IN LITERATURE AND SCIENCE.

Such was Matthew Baillie through the early parts and up to the zenith of his fame as anatomist, physician, and man of science. It is now time that we turn to the works he has left to us, and by which he belongs to us even to this day. The reputation of Dr. Baillie as a man of science and a contributor to medical literature rests entirely on his labours in morbid anatomy. To this department he was trained by and for his work under his uncle, William Hunter, during the short time he was with him, and afterwards in the School of Anatomy in which he laboured. His observations were largely collected in that school, and it has been observed that after he was fairly installed in practice he added nothing to literature of a new and original kind. His literary life terminated at his fortieth year, and by what he has left behind him, on which we are alone able to form a judgment of his powers, we must place him, first, as a morbid anatomist, and secondly, but quite in a secondary position, as a pathologist. To clinical medicine he added little, and to therapeutics nothing; in fact, as we may gather from his own statements, he made no pretence to therapeutical art. He could find out what was the matter with the sick better than most of his profession, because of his knowledge of anatomy; but of treatment he knew no more than the rest of his brethren. This was his own candid estimate of his own capacities—an estimate, perhaps, that might be adopted even in the present day by many a successful practitioner.

In his research as a morbid anatomist he followed to some extent the plan of Morgagni, for of conceptive genius he had no gift. He found a diseased organ or series of organs; he compared it or them with the same organ or organs in a healthy state; he wrote down, in

the briefest terms, the differences ; and he recorded the morbid changes as best he could from the knowledge of his day, with a short description of the symptoms that attend the morbid condition described. He tells us that his object was "to explain more minutely than had hitherto been done the changes of structure arising from morbid actions in some of the most important parts of the human body," and he was very exact in that which he committed to paper ; but, really and truly, he was not, according to our modern notions, very minute. He seems to have used the microscope in research very little, if at all ; and when he offered an exposition of a new line of observation, he followed rather than led. At the same time, he possessed a comprehensive idea of the range of morbid anatomy and the science which must spring out of it. He regretted much that the knowledge of morbid structure does not lead with certainty to the knowledge of morbid action, although the one be the effect of the other ; yet surely, he contended, it lays the most solid foundations for prosecuting new inquiries with success, and in proportion as men become acquainted with the changes produced in the structure of parts from diseased actions, they are more likely to make some progress, though slowly, towards a knowledge of the actions themselves. In this there was prediction which is at last being fulfilled, although still slowly, very slowly, and with much diversion from the royal road towards positive science.

A second advantage which Baillie detected as likely to spring from a knowledge of morbid structure is, that by it practitioners will be able to distinguish between changes which may have some considerable resemblance to each other, and which have been generally confounded—an advance that must lead ultimately to a more attentive observation of symptoms while morbid actions are taking place, and be the means of distinguishing diseases with greater accuracy. Another advantage arising from the same line of study was, he thought, that men will be better fitted to detect diseased alterations in the organisations of parts which are little or not at all known. "This will lay the foundation of inquiry into diseases themselves, so that there will be added a knowledge of the pathology of the body, and perhaps also of remedies." So he wrote.

But the most important advantage from the study of morbid anatomy put forth by Baillie was that, from observing attentively morbid structure, theories taken up hastily about diseases will be occasionally corrected. "The human mind is prone," he argued, "to form opinions on every subject which is presented to it ; but, from

a natural indolence, is frequently averse to inquire into circumstances which can alone form a sufficient ground for them. This is the most general cause of the false opinions which have not only pervaded medicine, but almost every other branch of knowledge. When, however, the mind shall be obliged to observe facts which cannot be reconciled with such opinions, it will be evident that the opinions are ill-founded, and they will be laid aside. We grant it does not always happen that men are induced to give up their opinions, or even to think them wrong, on observing facts which do not agree with them, but surely it is the best means of producing this effect ; and, whatever change may be wrought on the individuals themselves, the world, which has fewer prejudices to combat, will be convinced."

I have said that Baillie in his work was a follower of Morgagni in respect to plan ; and, on comparing the two for the special purpose of accuracy, I feel sure this view is generally correct. It is but fair, nevertheless, to say of him that he was not conscious on his own part of the fact, for, with simplicity of utterance, he declares that any works explaining morbid structure which he has seen are very different from his own : they either consist of cases containing an account of diseases and of dissections collected together in periodical publications, without any natural connection among each other ; or they consist of very large collections of cases, arranged according to some order. In the large works the diseased structure has often been too generally described, and the descriptions of the principal diseased appearances have also been sometimes obscured by taking notice of smaller collateral circumstances, which had no connection with them, or the diseases from whence they arose. In his work he does "not give cases, but simply an account of the morbid changes of structure which take place in the thoracic and abdominal viscera, in the organs of generation in both sexes, and in the brain. This is done according to a local arrangement, very much in the same manner as if we were describing natural structure, accompanied with occasional observations on morbid actions." His work contained chiefly an account of the morbid appearances which he himself had seen, and was intended to comprehend an account of the most common, as well as many of the very rare appearances of disease in the vital and more important parts of the human body. The nature of the work was progressive, and must have been so ; since some appearances of disease with which all were then totally unacquainted would, he knew, be observed in the future, and others which were little known of in his time would afterwards be known perfectly.

These were the principles he had in view in his earlier labours. In his later, as he tells us in the preface to the second edition of the work on *Morbid Anatomy*, published on November 20th, 1797, he added some of the symptoms to each kind of morbid appearances, naming those symptoms "which are most constant and most strongly characteristic of the diseases to which they belong." The account of the symptoms was placed at the end of each chapter, "that the anatomical part of the work might not be interrupted."

The passages above recorded afford a brief but fair statement, derived from the author's own words, of the plan adopted by Dr. Baillie in the construction of the essays on medical science which he has left to us. Their influence it is difficult now to estimate, for they have passed into the limbo of the forgotten. Yet even I can remember when in the lecture-room they were quoted as authoritative and when the reception of the *Morbid Anatomy* as a prize-book was considered by the student who "took it" as an unusual stroke of good fortune. True, also, it is that to this day the student who may, by accident or from curiosity, take up the volume, and the papers which preceded it, will find matter of deep interest. He will, for the moment, be removed from current minuteness; he will find little about degenerations, nothing about pectous or adenoid changes, nothing about cell growths, nothing about microbes; but he will still find foundations, still find truths which have to be accepted as good truths, though started and stated in the most elementary form. Beyond all, he will discern the evolutionary character of what is sound in progressive medicine, and may, perchance, be led to see more clearly than he would, without the study, what is devolutionary and retrogressive.

SOME DETAILS OF THE WORKS.

The works themselves are divisible into two series—a preliminary series of miscellaneous essays on various subjects connected always with morbid anatomy, and a special work entitled *The Morbid Anatomy of some of the most important parts of the Human Body*. To the last work the Author wrote two prefaces, one to the first, the other to the second edition, and afterwards added to it the engravings for its elucidation made by Mr. Clift, the copper-plates of which were bequeathed to the Royal College of Physicians.

The Miscellaneous Papers. Recognition of Aphasia.

The miscellaneous papers and dissections include sixty-three short essays on various subjects relating to morbid anatomy in its bearings on practice. The most original of these is one entitled *Case of Internal Hydrocephalus attended with some uncommon Symptoms*. This was the case of a gentleman, aged fifty-six, who was seized with symptoms of compression of the brain on February 9th, 1805, and became completely paralytic on the *right* side on the 11th of the same month. *By this attack he lost the recollection of the words of his own language*, except a very few, which he pronounced with the greatest distinctness, and without exhibiting that thickness of pronunciation which is so common in paralytic patients. The words "Yes, yes, no, no, Mr. Reed, yesterday," were employed on all occasions, and with a great variety of tone, to express pleasure and displeasure, joy and sorrow, to explain the circumstances of his disorder, and to give directions about what he wanted. He did not seem to be aware that these words were not the proper ones to express his meaning, for he often betrayed impatience when he was not understood, and was not mortified at so often repeating the same words. He could pronounce other words distinctly, but he never did so, except to repeat some words first uttered in his presence. He died on January 6th, 1806, after passing through all the now well-known stages of paralysis with muscular rigidity, "the right arm resembling that of a Fakir in Hindostan." The symptoms in this case were so singular that Baillie was most anxious to examine the brain after death. He did so two hours after that event. The membranes and cerebral substance were perfectly natural in appearance. The blood-vessels were not much loaded with blood, and there was no appearance of blood having been extravasated in any part of the substance of the brain. The lateral ventricles, however, were found to contain rather more than six ounces of water. There was no other diseased appearance, except that the left vertebral artery was enlarged in size, and that its coats had become opaque.

I give the report of this case at some length, because it is the first recorded example in this country of the disease that has in our days been named *aphasia*.

This essay is immediately followed by another entitled *Observations on a Strong Pulsation of the Aorta in the Epigastric Region*, in which is described, with great precision, the curious phenomenon of epigastric palpitation, without aneurism, or other aortic lesion.

The precise nature of the affection Baillie did not pretend to understand, and he did not connect it with the *cœliac axis*; but he was conversant with the fact that the phenomenon is met with most frequently in combination with dyspeptic symptoms. He was thus led to a more correct diagnosis of abdominal pulsation than had previously prevailed; and, although Wardrop declares that he was sometimes mistaken, he made without doubt an advance in detecting a condition of disease which had been unsuspected, had often misled practitioners, and had caused a comparatively harmless symptom to be mistaken for one almost certainly fatal in character.

The Work on Morbid Anatomy.

The temptation is strong to continue the description of the miscellaneous papers: but here I must conclude notice of them in order to refer, in the briefest terms, to the major work on morbid anatomy. This treatise, divided into twenty-four chapters, refers systematically to diseased appearances of the pericardium, the heart, the cavity of the thorax, the lungs, the thyroid gland, larynx, and parts contained in the posterior mediastinum, the cavity of the abdomen, the stomach, the intestines, the liver, the gall-bladder and biliary duct, the spleen, the pancreas, the kidneys and renal capsule, the urinary bladder, the *vesiculæ seminales*, the prostate gland, the urethra, the testicles and spermatic cord, the uterus, the ovaria, the Fallopian tubes, the vagina, the external parts of the female organs of generation, and the brain and its membranes.

It will be seen from this list how wide was the field of observation in the book on morbid anatomy, and a difficult task it would be to make any selection that would specially represent the industry of the author. The remarkable feature of the treatise is the even tenor of its course. Divided, it is almost commonplace; taken as a whole, it is almost genius—genius of honest observation and admirable industry. To the practitioners of its day it must have been veritable light thrown upon what had been the darkest places; but from its method and from its brevity it lacks the spontaneity of the miscellaneous essays. The observations on the chemistry of gall-stones, on the nature of ovarian dropsies, and on the condition of the brain in hemiplegia in which the author infers, I believe for the first time in physic, that “the right side of the

body derives its nervous influence from the left side of the brain, and the left side of the body its nervous influence from the right side of the brain," form the choicest of its pages.

THE CLOSE OF A BRILLIANT CAREER.

Up to the year 1823 Baillie continued in his brilliant course, working at the rate of sixteen hours a day amidst all the external bustle and wear of London life. From 6 a.m. till 8.30 a.m. he was occupied with letters; from 8.30 until 10.30, less a short interval for breakfast, he received patients at his own Grosvenor Street house; and afterwards, up to 6 p.m., he was out visiting patients, chiefly in consultation. The hours of 6 to 8 p.m. were consecrated to dinner, after which, often until a late hour, he returned to outdoor visiting work. At the same time he disdained all artificialities, and not only refused the baronetcy, but after permitting himself, under much persuasion, to sit to Hoppner for a portrait, the autotype of which is supplied with this life, was so annoyed at seeing the engraving of it in the window of a print-shop that he bought up the copper-plate. He was most unassuming in manner and simple in his mode of life, caring nothing for show, and taking as little of pleasure as of repose.

It was but natural that a man of his rather feeble physique should wear out rapidly under the unceasing activity of mind and body to which he subjected himself. He became old whilst he was yet young, and began to feel the exhaustion of overwork by the time he had reached his fiftieth year. He now treated himself to an autumnal vacation, and made a journey for the first time since he left it—about 1809—to Shots, his old Scottish home; but the change brought to him sorrow rather than relief. He bought an estate in Gloucestershire, on the Cotswold range, and would rusticate there, riding about on a small pony, seeking rest and finding none. From country quiet he soon felt desire to return to his home duties, tormented with unceasing *ennui* until he got back into work, and tiring in turn at that. He became, after a few seasons of this varied round, emaciated, and deficient in mental energy. In 1823 he was laid by from inflammation of the trachea, followed by recurrent fever and cough. He retreated, for a period, to Tunbridge Wells; but got no benefit, and acquired a dislike for food. From the Wells he returned to Gloucestershire, but gained no relief there, and after lingering for a time, suffering severely,

he died on September 23rd, 1823, in the sixty-second year of his age.

The news of the death of Dr. Baillie, when it reached the Metropolis, caused universal sorrow and demonstrations of respect. The members of his own profession met in order to raise a subscription for a monument to his memory in Westminster Abbey. The Royal College of Physicians passed a resolution of sorrow and respect, and had it entered on their minutes. The politicians forgot their differences, and the Tories, who could hardly forgive a fashionable physician who declared himself a Whig, and would not give a Tory vote to a Tory nobleman for the county of Gloucester, joined with the rest of the community in sympathy.

But the highest honour and respect to Matthew Baillie fell from the lips of his most illustrious cotemporary, Sir Humphry Davy, who, commenting on his memory from the chair of the Royal Society, concluded his panegyric with these words:—

“An honour to his profession in public life, he was most amiable in his most intimate social relations and domestic habits. No man was ever freer from any taint of vanity or affectation. He encouraged and admired every kind of talent, and rejoiced in the success of his cotemporaries. He maintained amidst courts the simplicity and dignity of his character. His greatest ambition was to be considered an enlightened and honourable physician. His greatest pleasure appeared to be in promoting the happiness and welfare of others.”

After such a tribute from such a master, who shall deny that medicine, in one of her sons, was nobly recognised?

John Moore, M.D., and *Mooriana*

THE Englishman of middle age who hears the name of Moore pronounced from a work of history immediately recalls a battle, a hero, and a poem. He thinks of the battle of Corunna, in which Soult was defeated, and the most magnificent retreat ever accomplished by British warlike skill was carried out; he recalls the death of the brave Sir John Moore; but, above all, he remembers the exquisite poem commencing:—

“Not a drum was heard, not a funeral note,
As his corse to the rampart we hurried;
Not a soldier discharged his farewell shot
O'er the grave where our hero we buried,”

a poem which alone gave to its gifted and fortunate author, Wolfe, an all-sufficient entrance to the temple of fame.

Strange, with it all, is the fact that the world should have forgotten, and stranger still that the profession of medicine should have forgotten, the fact that the famous hero “left alone in his glory” on the battlefield had a father who in his walk of life was as illustrious as any of his compeers, a man of great and popular mark also, whose name, if it had not been eclipsed by that of his soldier son, would have shone out as permanently as it did shine out temporarily whilst that son was carving his way to the immortal respect and love of his countrymen all the world over.

Yet this was the fact. Dr. John Moore, whose life I am about to recall, the father of the general, was a man of the most distinguished mark in the professional circles of his day, was the cotemporary of the brothers Hunter, must have come, I suspect, across John Hunter times and often, was the friend and biographer of Smollett, must have known Hewson, and did know many men of eminence so favourably that two of them, at least, the Rev. F. Provost and

F. Blagden, put together after his death the leading facts of his career, and under the title *Mooriana* collected many of his best sayings, leaving to us some really valuable history as well as some things of true wisdom, told in a style as enticing as it is worthful.

In the life of Dr. Moore, we have to go a little apart from the strictly practical in medicine, a change for which I make no apology. Medicine is as wide as all knowledge and all wisdom; for does she not comprehend all life, and is not life and the action of life all that belongs to man? It is the glory of Medicine that she is so comprehensive that men of every class—philosophers, poets, naturalists, chemists, astronomers, historians, novelists—have sprung from her, as from the mother of the arts as well as the sciences. Moore, in a sense, was an outsider. After the manner of his friend Smollett he was a traveller, historian, and novelist, yet withal a physician practising as such, at one time working hard in his vocation, and apparently never leaving it until from it death did him part.

By a fortunate circumstance for history, Moore was in France at a time when that country was pregnant of a new political system, after surviving fifteen centuries of monarchy good, bad, and indifferent, and in the end bad of bad. We have recently been taught by the great work of Felix Rocquain * what was the revolutionary spirit of that astounding period of history. But here was an Englishman who saw the preparation, and who, like Smollett, who also saw it, forecast faithfully the results. This opportunity, and many other opportunities of similar and diverse kinds, rendered Dr. Moore a scholar in general as well as in medical learning, and without taking away one iota from his medical accomplishments, in a practical point of view, caused his mind to open to the reception of impressions of knowledge and wisdom until he became, I think, the wisest as well as the best informed of all the physicians of his day and generation. But I must not anticipate. Let the history of the man be the best and truest witness of the fact, and let all inferences stand over until the man is better understood.

BIRTH AND EARLY EDUCATION.

Moore was born at Stirling in the year 1730, two years after the birth of John Hunter. His father, the Rev. Charles Moore, was a minister of the Episcopal Church of Scotland in Stirling, and was

* Condensed and translated into English dress by Miss J. D. Hunting, with a characteristic preface by Professor Huxley.

much beloved for the purity of his life, his devotion to his calling, and the benevolence of his nature. His mother, a native of Glasgow, the daughter of John Anderson, Esq., of that city, was a fitting companion for her husband. She was a woman of superior understanding, firm character, and gentle disposition. Unhappily the union of his parents was soon dissolved, for his father died when he was but five years old, and he, an only child, was left on the hands of his mother entirely for his guidance and support. He went in his early years to the Grammar-school in Stirling, and the profession of medicine being that for which he was destined, he was taken by his mother to Glasgow, very early in his life matriculated there, and was afterwards placed with a respectable medical practitioner in the city, Dr. Gordon, to learn the elements of his craft. They must indeed have been elements, for his biographers tell us that in the seventeenth year of his age he left Scotland, and, under the protection of the Duke of Argyll, passed over to the Continent to Flanders, and served as surgeon's mate at the military hospitals there, during the expedition of the Duke of Cumberland. In this capacity, one which was much sought after in those days as a ready means of entry into medical life, he acquired a large amount of practical knowledge and skill, and after two years returned to these islands and made his way to London. From London, after a brief stay, he went to Paris for the purpose of availing himself of the medical and surgical instruction to be obtained in what was then considered to be the first medical school in the world. He made a fortunate start in Paris. The British ambassador at that time was Lord Albemarle, a nobleman who had acted as general under the Duke of Cumberland, and who had also been colonel of the Coldstream Guards, to which regiment Moore had acted as surgeon's mate. The ambassador received the young surgeon, when he paid his respects at the Embassy, with great favour, took him under his protection, and appointed him surgeon to the Embassy as well as to his own family. He therefore remained in Paris two years, in practice on his own account in English circles, and paying regular attendance at the hospitals and courses of medicine that were open to him for study.

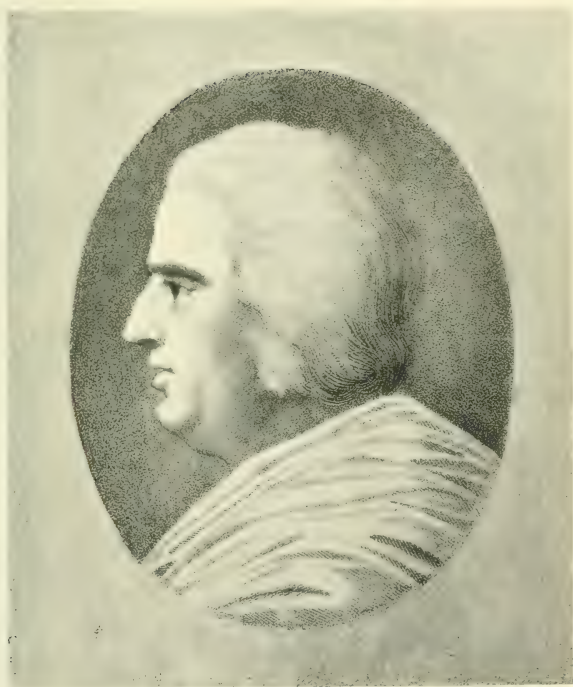
PROFESSIONAL CAREER.

At the end of these two years, Moore returned to Glasgow, graduated there, joined his former master or tutor, Dr. Gordon, at his request, as a partner in practice, and about 1769 married Miss

Simpson, the daughter of the Professor of Divinity in the University of Glasgow, and by her had five sons and one daughter, his first-born becoming the famous Sir John, the hero of Corunna.

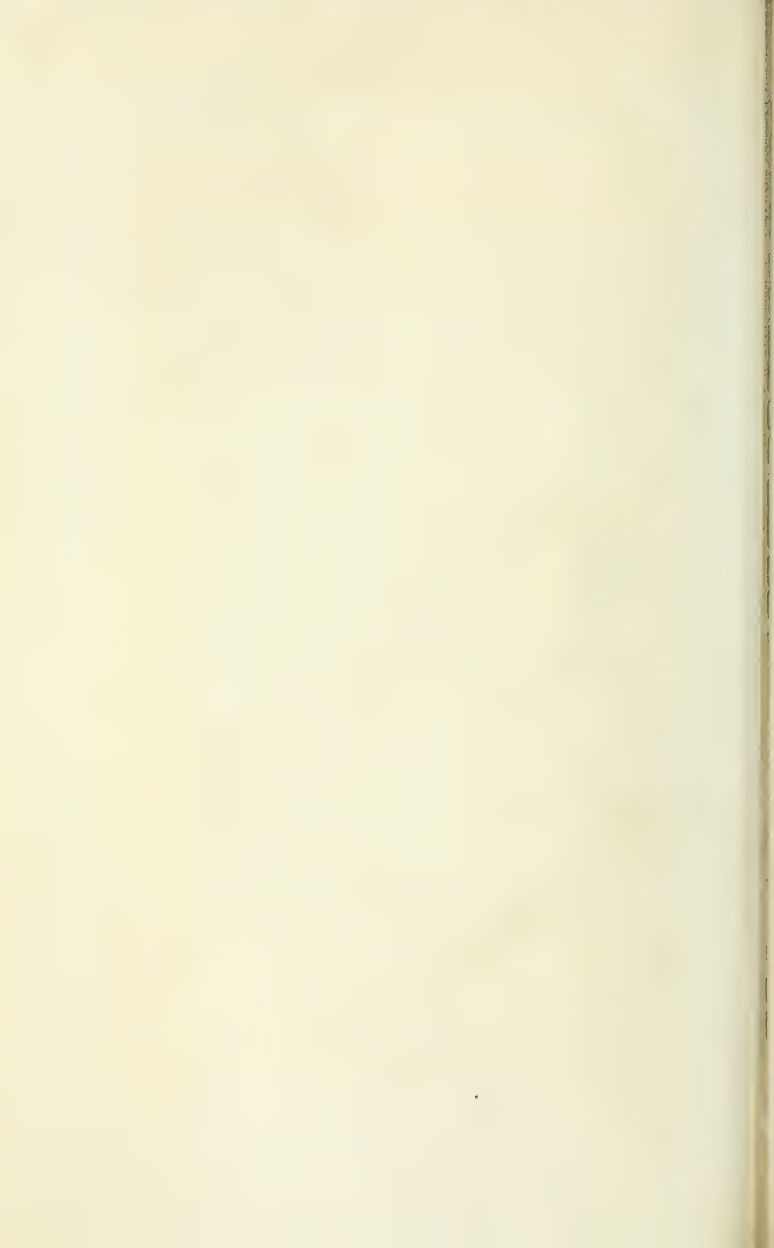
The partnership with Gordon was mutually advantageous, and until he attained his fortieth year Moore remained steadily at work as a physician in Glasgow. During this time he became the favourite medical attendant of the Hamilton family, giving the most conscientious care to the case of James George, Duke of Hamilton, a youth who after a lingering consumption died in his fifteenth year.

The attention of Moore and his real affection for his patient endeared him to the family; and when Douglas, the brother of the late Duke and successor to the title, himself in very delicate health, was obliged to go abroad on travel for the sake of his health, Moore accompanied him for a period of five years—namely, from 1772 to 1777. In the course of this time, he travelled through France, Italy, Germany, and Switzerland, making the most careful observations of men and things, forecasting events, and preparing notes for books of travel which were ultimately to become amongst the best-known works of the time, one of them passing through nine editions. His connection with the Duke of Hamilton, all through, was of the greatest service to him in his studies. It permitted him to enter into what were considered the highest classes of society, and it did not prevent him from going amongst the lowest, in order to glean facts and figures on all sides. We shall see when we come to consider the literary work of Dr. Moore that his residence in France and his travels in other parts of the Continent gave him insights into then current events which were well and faithfully utilised. It is not wrong to say that he enjoyed his exile; but on coming back to this country he determined to settle himself for the remainder of his life in the great Metropolis. He returned in the year 1778, took up his residence with his family in London, and entered into practice, after the manner of a general family physician, unconnected with the Royal College of Physicians and with any special branch of practice. It is said that he did not enrich himself on the labours of practice, and from the prolific nature of his literary work it is certain he had not much time on his hands to attend very closely to the sick and afflicted. He took whatever practice came to his hand, without much trouble or searching after it, and let his active mind revel in the pleasures of imagination and the pursuits of learning, the friend of all men of culture, the close friend of liberty, and, in his circle, an authority much respected and warmly admired.



JOHN MOORE, M.D.

From an engraving by Hopwood, after an original drawing.



In this life of home delights, in which his wife, his five sons, and one daughter, heartily shared, esteemed by "a numerous public as a judicious and prudent physician, who, considering himself an assistant to Nature, left her when her power seemed sufficient to perform her own cure, and assisted her when too feeble by every means in his power"; in this happy life, with the beautiful garden of literature ever under cultivation, he lived on until the year 1792, when his career was suddenly diversified by another call to Paris, in company with his old friend Lord Lauderdale—whose state of health demanded the care of a wise physician—and with one of his own sons. They embarked at Dover on August 4th, 1792, and in a few hours arrived at Calais. Next day they reached Abbeville, where, although the descent of an Austro-Prussian army was expected, they found the country people enjoying themselves in "dancing cotillons under the shade of trees," as if all were peace and pleasure. On August 6th they reached Clermont, meeting many flying people, and on the 7th they were in Paris.

At the moment when Dr. Moore found himself in the French capital, that capital was in the height of political fire. He made his way to the Assembly to listen to the fire of the debates. At two o'clock of the morn of August 10th, he was awakened by the sound of the tocsin in the streets, and at nine by the firing of the cannon which preceded the downfall of a monarchy that for so many centuries had governed, without serious dispute, the destinies of France. Soon after the firing had commenced, he heard the cry of "To arms, citizens, to arms! They slaughter your parents, your brethren, your sons," and he saw men running half frantic through the streets exclaiming in that manner. Lord Lauderdale was too unwell to quit the house, the Hotel de Moscovie, in the Faubourg St. Germain; but Moore, leaving his son with the invalid, went out to witness the scenes that were in such fearful progress. A number of armed citizens were marching towards the Tuileries; another set followed, dragging five cannon along the Quai de Mazarin, where he waited, to the Pont Royal. Here he ran a great risk, for as a body of pikemen passed him one of them pointed him out as an aristocrat—a fatal distinction. Fortunately the *valet de place* who had accompanied him called out that, so far from his being an aristocrat, he was "un Anglais" "Bon!" cried the pikemen, and marched on.

These were critical hours in the seat of revolution, and the reader will feel no surprise when he is told that Dr. Moore and his friends were not slow, as matters progressed from bad to worse, to leave a

city in which danger as well as horror marched, hand in hand, daily. They left Paris on September 4th, Lord Gower having been recalled from the Embassy on August 28th, and arrived at Chantilly the same day. On the 5th they reached Amiens without any misadventure, and there found the statue of the great Condé, which stood in the grand staircase of the castle, bereft of its head. "I never," said Moore to the attendant who showed them the apartments of the castle, "have seen Chantilly *dans un si triste état*." "*Aussi, Monsieur,*" answered he with a sigh, "*n'a-t-il jamais été si triste.*" Travelling through Flexcourt, they came on to Abbeville and so to Boulogne, which last city they reached on September 10th, and remaining there a day or two, passed on to Calais, where they stayed until the beginning of October. Then, having received information that a National Convention from all departments of France was assembled in Paris, and that the Prussian army had retreated, it might, they imagined, be the fact that a permanent and free government would be established. It was not a very hopeful look-out, from the accounts given of some of the deputies; yet, as on the measures which this assembly should adopt the fate of France, perhaps the fate of Europe, might depend, Moore and his friends resolved to set out again for the capital, by the way of Lille, in order to be eye-witnesses of the proceedings that were to take place. They reached Paris on October 10th. They remained there until December 14th, after which they were not long before they returned to London, where Moore resumed his labours in practice and literature, with plenty of occupation on hand from both sources.

THE WORKS OF DR. MOORE, MEDICAL AND GENERAL.

Moore was in the truest sense a many-sided as well as an accomplished and learned man. If I said of him that he had true genius I should not speak faithfully. He was deficient in the poetic faculty. He was laborious, painstaking, broad, and liberal in thought as well as action. He had the gift of imagination, but that gift was either limited by nature, or his practical soul made him timorous when his imagination wished to take wing. This is poor progress, and has spoiled many a great man. Imagination is not given to a man to be cribbed and confined like a prisoner, and held subservient to what this pedant will think or that prig will say. A moderately endowed imagination may manage to live; a cowardly imagination may for a moment lift its head; but the imaginative genius that is

to float over the ages, and be known as a star in the firmament of fame, even though it be as a star of smallest magnitude, must be free as the eternal space in which it moves, and lustrous, however faintly, of eternal fire. Moore was no coward; he was as brave a man as ever Scotland produced, and as honest; he had imagination with courage and honesty; but the imagination was by its own nature limited, and therefore not such a light to the ages as to hold the attention of mankind by its own intensity. Its light was diffuse: it was medical, it was philosophical, it was imaginative, it was historical; and it displayed itself in each of these directions. We will contemplate it in the divisions so specified.

MEDICAL WORKS.

In the year 1785 Moore published a treatise entitled *Medical Sketches*. It was what one might suppose it to be from its name. It was devoid of all technical terms and technicalities; was addressed, in fact, to the educated few of all professions, rather than to the one profession. Sometimes there is in it a touch of humour, which is, however, too guarded and delicate to be of remembrance as true and lasting humour. Medically, there is about the work much compilation, with a wisely running commentary showing a well-read man in medicine, and maybe a full man, without betraying a searching man, or an original. Anecdote abounds, so that the volume is rather better fitted for the armchair, the bed—just before dropping off to sleep—than for the study. No one asking for more light on a troublesome or serious case of disease would take it down for the purpose of getting light out of it; but it is good of its kind, and is of profit for leisure. The *Mooriana* of his biographers supply, very happily, many of his views respecting things medical. He complains of the ignorance of physicians, especially in reference to the nervous system. "If," he says, "the ablest mechanic were to attempt to remedy the irregular movements of a watch while he remained ignorant of the structure and manner of acting of some of the principal springs, would he not be in danger of doing harm instead of good? Physicians are in the situation of such a mechanic; for, although it is evident that the nerves are the organs of motion and sensation, yet their structure is not known. We are ignorant why the will which has no influence over the motion of an animal's heart should find the feet obedient to her dictates; and we can no more explain how a man can move one leg over the other by volition, or

the mere act of willing, than how he could by the same means move Ossa on the Olympus. The one happens every moment; the other would be considered a miracle. While so many parts so infinitely essential to human life are not understood, instead of being surprised that so many diseases baffle the skill of the physician, we have more reason to be astounded that any can be alleviated or cured by his art."

Referring, in another place, to the brain, he remarks: "The sum of our knowledge upon it is, that the brain is the seat of thought and origin of all sensation and motion, that every sensation is conveyed thither, every idea formed there, and that the power of every motion proceeds from thence through the nerves to the muscular parts of the body."

The practice of physic he held to be that of all others in which the generality of mankind have the fewest lights by which they can discern the abilities of its professors, because the studies which lead to it are "more out of the road of usual education, and the practice more enveloped in technical terms and hieroglyphical signs." But the safest criterion by which men, who have not been bred to the profession, can form a judgment of those who have, is "the degree of sagacity and penetration they discover on subjects equally open to mankind in general, and which ought to be understood by all who live in society."

Valetudinarianism.

Occasionally he follows Molière in his humour on this topic. He relates an anecdote in which a valetudinarian and his physician are in consultation.

The patient is assured that he is physically in good condition; then observes the patient, "What a pity it is that I never had the gout! That is a disease, I understand, which removes others that have resisted every method of cure."

The physician assents.

"Cannot you then give me a fit directly?"

"Indeed, I cannot," the physician responds.

"Yours seems to be a very unfortunate profession, doctor," is the retort; "for although you deal entirely in diseases, yet you are neither certain of removing them from those who have them, nor of giving them to those who have them not."

"What you observe is very true."

"A good many of your profession have had the honour of knighthood conferred on them of late."

"A great many, sir ; by-and-by I suppose no man will presume to practise medicine without it."

"As in the days of chivalry, when no man could kill on the highway till he was dubbed a knight. But what do you intend, doctor, to prescribe for my complaint? You must be sensible that there is no time to be lost."

"True, sir: I shall order you some restorative draughts ; but I must assure you, at the same time, that their good effect will be greatly assisted by your riding on horseback three or four hours every day before dinner."

"You mean when the weather is fine?"

"I mean in all weathers."

Aura Epileptica.

He paints very clearly the phenomenon of the "*aura* in epilepsy," described by some as like to a current of fresh air, flowing slowly ; by others like an insect moving or creeping upwards from the extremities of the body to the head, where it no sooner arrives than the patient becomes insensible, and falls into an epileptic fit. This first sensation Moore thought is generally felt at one particular point, and we may presume there is some disorder in that point from the circumstance of the *aura* beginning there. The disease, he supposed, might be radically cured by destroying the part ; when this cannot safely be done, the fit might, he assumed, be prevented by a ligature applied above the part where the *aura* arises.

Views on Hypochondriasis.

He describes hypochondriasis as a disease arising often in persons of previous good health, and in opulent circumstances ; and he seems to accept a common opinion in his day that it is a malady singularly frequent in England. The patient, he explains, becomes regardless of things of the greatest importance, and which formerly interested him most ; he is averse to every kind of exertion of body or mind ; he becomes infinitely attentive to a thousand trifles which he used to disregard, and he is particularly watchful of every bodily feeling, the most transient of which he often considers as the harbinger of disease. Everything appears to him dark and dismal. He is always apprehensive of the worst, and considers the most indifferent and even the most fortunate incident as the omen of some impending evil. Although in his

brighter days he may have been a man of courage, he is now preposterously afraid of death, although he may seem to have lost all relish for the enjoyments of life. The wretched creature, growing every hour more irritable and peevish, flies at length to quacks. Their well-attested and infallible remedies hurry on the bad symptoms with double rapidity; he returns to physicians, goes back to quacks, and occasionally tries the family nostrums of many an old lady. His constitution being worn by fretfulness and by drugs, he at length despairs of relief, and either sinks into a fixed melancholy, or, roused by indignation, his good genius having whispered in his ear, *Fuge medicos, et medicamina*, he abandons the seat of his disappointments; tries to dissipate his misery by new objects and a different climate; consults no practitioners of any country, sect, or denomination, and forms a fixed resolution to swallow no more drugs; from which happy epoch, if the case be not quite desperate, he has the best chance of dating his recovery.

Power of Curing Diseases.

On the question of the power of curing diseases possessed by medical men, Moore thought that, in accordance with the experience of ages, the great and ultimate effect of the art of medicine, cure, is more effectively attained by diligently observing the course and symptoms of distempers, and the effects of the means used for their relief, than by the most plausible reasonings on their supposed nature and causes. This purely empirical argument of Moore was supported by a theory which all would not agree with: namely, that the plan of seeking into causes has proved more attractive to many ingenious men of the profession, for a reason sufficiently obvious, to wit, "that it suits, in a particular manner, such as are employed in lecturing to students of medicine."

Remedies for the Influenza.

In the time when Moore lived, influenza, as in our time, was sometimes epidemical, and many remedies were then, as now, propounded for it. Our rather sceptical doctor—for he was a little questionable on some important points of ancient orthodoxy—indicated his faith in remedies by the following dialogue:—

"A country apothecary in the course of conversation told a gentleman that he had been visiting three or four patients in a neighbouring village who were ill of an influenza.

“‘Pray,’ said the gentleman, ‘how do you medical gentlemen treat that complaint?’

“‘Why,’ replied the apothecary, ‘there is no saying how the physicians treat it, for some of them order one thing and some of them another; but the surgeons generally bleed for it; and as for us apothecaries—we *drench*.’

“‘Ay! that is natural enough,’ said the gentleman; ‘but you know I once studied physic myself, and have some general notions on the subject; so when this epidemic began amongst my servants and tenants, I ventured to prescribe barley water for them.’

“‘Barley water!’ cried the apothecary, with disdain. ‘You might as well have ordered them water gruel!’

“‘I might so, for which reason I gave them the choice; and what do you think was the effect?’

“‘Why, barley water and water gruel could have no effect,’ said the apothecary.

“‘It is indeed difficult to ascertain what is the effect of many things that are prescribed; but I can at least tell you what was the consequence.’

“‘That is the same thing,’ said the apothecary.

“‘Not quite,’ replied the gentleman, ‘though in the practice of physic one is often mistaken for the other.’

“‘Well, what was the consequence?’

“‘Why, they all recovered!’

“The apothecary, having remarked that there was a great difference in constitutions, abruptly took his leave.”

Vis Medicatrix Naturæ.

Moore describes the *vis medicatrix* as “that inherent bias in the animal economy leading to restoration of health from disease.” He illustrates it by a simile: “As the surface of a lake which clearly reflects the sky, the hills, and the verdant scenes around its borders, when it is disturbed by the falling of a stone, immediately endeavours to recover its scattered images and restore them to the same beauteous order in which they were wont to appear, so in like manner, when the natural course of the animal economy is interrupted and disturbed by disease, the powers of the constitution are continually endeavouring to restore its organs to the perfect use of their functions and to recover its usual vigour and serenity.”

"The *vis medicatrix*," he adds, "was observed by the father of medicine." The same observation was expressed by Sydenham: "It is acknowledged by all candid and discerning practitioners to have a powerful influence in the cure of diseases. Indeed, physicians, in proportion to their candour and discernment, acknowledge and rely on this power of nature; and in proportion to their selfishness and weakness impute every recovery to their prescriptions."

Medical Errors of the Fifteenth and Sixteenth Centuries.

The gloom which seems to have settled on the minds of men in the fifteenth and sixteenth centuries was a theme on which Moore has two or three times commented. In religion and in medicine everything pleasing was thought to be sinful, and by many enthusiasts "what gave the greatest pleasure was considered the greatest sin." The physicians applied this idea to the practice of medicine: they condemned everything that was most agreeable to a sick person's tastes or feelings, declared it noxious to his constitution and the more noxious in proportion as it was agreeable. In many instances they treated their patients as if they had been persuaded that the most effectual way to restore health was to prescribe what was most repugnant to the taste of the sick man. If he complained of heat, additional bedclothes were heaped upon him to force a sweat; if, half stifled, he begged for a little fresh air, the bed-curtains were drawn closer, because cold ought to be most guarded against when the body is hottest; and if he complained of thirst, and entreated for a draught of cold water, he was presented with a draught from an apothecary's shop well impregnated with spiceries. "How many victims," he asks, "since the period alluded to have been sacrificed to the pride and obstinacy of mistaken science, dazzled by the meteors of theory, and despising the humble paths of experience pointed out by the earlier professors of the healing art!"

The Concluding Scene of Nature.

Hippocrates himself might almost envy the graphic description which Moore has left of the last hour of life in man. Of course the description does not apply to all last hours, but it does to many, and it may be accepted as a fair picture of the natural and final collapse which follows gradual asthenia from acute disease and from decay of vital power:—

"When nature and the efforts of the physician prove unable to resist the malignity of disease, all the distinguishing marks of disease are obliterated, and the concluding scene is common to all.

"The strength being almost entirely exhausted, the patient lies constantly on his back, with a perpetual propensity to slide towards the bottom of the bed; the hands shake when they attempt to lay hold of anything, and a continual twitching is observed in the tendons of the wrist; the tongue trembles when it is pushed forth for inspection, or all attempts to push it forth are unsuccessful; a black and glutinous crust gathers on the lips and teeth, to the increase and inconveniency of which the patient seems now insensible. He seems equally insensible to the ardour of thirst; he mutters to himself; he dozes with his mouth half open, the lower jaw falling down as if the muscles were too much relaxed to resist its gravity; he sees objects indistinctly, as if a dark cloud hung before his eyes; small black particles, called by the physicians *muscæ volitantes*, play, as it is believed, before his eyes, for he often catches with his hands at those or some other objects of his disordered brain; he frequently extends his arm before and above his face, seeming to contemplate his nails and fingers, and picks the wool from off the bed-clothes; he loses the power of retention; the evacuations pass involuntarily; and, as if lamenting his own deplorable condition, tears flow down his ghastly countenance; the pulse flutters small as a thread, and on a pressure very little stronger than common is not felt at all; his legs and arms become cold, his nails and fingers blackish; his respiration is interrupted by hiccups and finally by death."

Temperance and Health.

Had Moore lived and flourished in these days of progressive temperance, he would have been welcomed amongst the abstaining ranks as an invaluable ally. He was far in advance of his time on this subject. Speaking of intoxication, he reckoned it amongst the causes of fever, and declared that the general bad effect of it upon the constitution is obvious.

"Whenever," he says, "a predisposition to any particular disease lurks in the constitution, intemperance in drinking seldom fails to rouse it into action. Repeated excesses of this kind sometimes produce the epilepsy in those never before subject to it, and always hasten the return and augment the violence of the fits in those who are.

"To increase good-humour, gaiety, and wit, and prolong the pleasures of conversation, is the usual apology for such excesses. But if it were a general rule to leave the company as soon as our taste and talents for sensible or witty conversation began to diminish, few would injure their constitutions by drinking.

"There are, indeed, examples of people who support long and repeated excesses without much apparent injury. There are also instances of people who have swallowed poison with impunity. But tell those who are acquainted with such tough and well-seasoned veterans to recall to memory the numbers of their companions who, yielding to importunity, have fallen victims to this easiness of temper, and they will not be much encouraged by the example.

"Although intoxication never fails when first indulged to produce most of the symptoms which attend fever—as heat, drought, headache, and nausea—it must be confessed that these wear away by habit, so that those who indulge every day in the bottle, if they survive the excesses of their youth, and escape consumptions, dropsies, and paralytic complaints in more advanced life, are in little danger of being cut off suddenly by a fever from drinking; they will have the comfort of outliving not only their friends, but very probably their own understandings.

"In some instances where people have fallen down insensible by extraordinary excess in drinking, a supervening fever has been considered as the only thing that saved them from a fatal apoplexy. It must be allowed that a disease must be of a very desperate nature for which a fever is the only remedy, and this remedy not always effectual; for it sometimes happens, particularly to young persons of a sanguine habit, that, in consequence of great excess in drinking, a fever of such violence is raised, that the patient dies after a few days of high delirium."*

In another characteristic passage Moore points out how the action of alcohol tends to promote *ennui* and depression of the mind. The passage is very true and striking:—

"Of all the contrivances to exclude this intruding demon, *ennui*, from the mind of man, the most debasing and destructive is the use of intoxicating liquors; that pernicious habit blunts all desire of improvement, darkens emulation, obscures the understanding, sinks

* "Hippocrates mentions in his third book of *Epidemics* the instances of two persons who—ex potibus ambo periculosa febre decubuerunt; quorum primus secundo jam morbi die surdus factus fuit, dein ferociter deliravit, quarto die convulsus, quinto die periit alter vero, post difficilem morbum, vigesimo die evasit."

the soul into sluggishness, renders men insensible to the love of reputation, familiarises them with the idea of contempt, and extinguishes every enjoyment but that maudlin delirium, excited by spirituous liquors, which carries them to their graves."

WORKS PHILOSOPHICAL AND IMAGINATIVE.

The philosophy of Dr. Moore is shown rather in scattered passages of his writings, than in the compass of any one essay or volume. As a rule it is always sound and pleasing rather than abstruse and puzzling. It consists, usually, of short passages on different topics, suggested by sayings or events, not from systematised order of thought. Thus, on the words of Apelles spoken to the cobbler, *Ne sutor ultra crepidam*, he contends that the maxim applies to such professions as call for mechanical skill only, not to exertion of the mind. A man, however ingenious, who would attempt to make a chair without being bred to the work would certainly succeed much worse than one accustomed to the trade; but the mind is more flexible than the muscles, and the man who has been in the habit of reflecting and reasoning all his life will reason better, even on a new subject, than another man of a narrower understanding who has been accustomed to investigate it. In example, he shows that men who have not been trained in the art of war and men who have not been bred to statesmanship have often greatly excelled in those arts, and been rendered famous by the display of talents which had previously laid latent in them. He makes many sensible observations on the passions of mankind; explains that hatred always betrays itself, that seduction is a very feeble justification of a *faux pas*, that every sentiment of the mind has particular parts of the body in correspondence with it, and that first impressions, which sink into the heart and form the character, never change. He held that ideas were not innate, and adduced in support of that belief the saying of a young Oxonian, who, being told by his tutor that the most permanent happiness of life proceeded from our ideas which were not innate, replied, "I am sorry for it, for if they had been we should not be put to the trouble of reading for them."

The imaginative works of Moore were three in number. The first was a story called *Zeluco*. It was published in 1787, and was presumed to be educational and moral in its meaning. It is, in so many words, the life of a rich rascal who, spoiled by his mother and trained to no self-control, became about as infamously wicked

as it is possible for anything human to become anywhere. The author says that in this story he was "tracing the windings of vice and delineating the disgusting features of villainy." The story must have attracted, for the *Childe Harold* of Byron was a poetical *Zeluco*. This novel was followed by one called *Edward*, 1790, the hero a kind of second Tom Jones, less the fine passages which introduce each chapter of that immortal fiction. It introduces a heroine in the character of a truly good woman whose worth surpasses and supplements admirably the absence both of beauty and accomplishment. The third story, styled *Mordaunt*, was constructed after the manner of Samuel Richardson in that it takes the form of a series of letters. In these the life of the principal person is described by himself to a military friend named Colonel Sommers. The work introduces *Sketches of Life, Character, and Manners in Various Countries, including Memoirs of a French Lady of Quality*. It was published in the year 1800, and was considered, in consequence of its anecdotes and incidents of travel, the best work of fiction that Moore produced.

HISTORICAL WORKS.

It remains for me now to dwell for a brief period on the character of Dr. Moore as the historian. In this position he holds a very distinguished place—a place that has been but poorly recognised in the world of literature. In his historical labours he gave little vent to imagination, made comparatively few commentaries, spread out no long-strung details, but kept to his subject and related, most carefully, that of which he was the eye-witness. The best of his works, the most forgotten, and, at the same time, the most likely to be enduring, is that which records what he witnessed in the furiously fiery days of the great French Revolution of 1792. He went to France at that time; stayed in Paris until after the eventful 10th of August; retired to Calais; returned to the capital after the appointment of the National Assembly, and remained there until a few weeks before the execution of the King, collecting his observations and experiences. These formed two volumes published as a *Journal* by Robinson, of Paternoster Row, in the year 1793. They bring their author's personal knowledge up to the 14th of December, 1792, and they contain a statement, derived from the best sources, of the events which culminated in the execution of the King on the 21st of the next month, January 1793.

It shows an astonishing courage on the part of Moore that he ventured to wander about as he did in Paris in the midst of all the prevailing horrors of the time, and entered into conversation with the most excited revolutionists in order to obtain a faithful record of events and expressions of opinion. In the club of the Jacobins, in the National Assembly, in the streets of the distracted city, in the shops and hotels, amongst the rich and amongst the poor, there he was, witnessing scenes from which he was sometimes obliged to turn away, but never indicating the least fear on his own account. He watched the prime actors in the awful tragedies that were being played, and depicted some of them with a masterly hand. He knew Marat as one of the vilest and cruellest medical lunatics medicine ever had in her ranks, and described the ferocious monster in words that almost burn as they are read :—

Marat.

“ Marat is a little man of a cadaverous complexion, and a countenance exceedingly expressive of his disposition. To a painter of massacres, Marat’s head would be inestimable. Such heads are rare in England, yet they are sometimes to be met with in the Old Bailey. The only artifice which he uses in favour of his looks is that of wearing a round hat so far pulled down before us as to hide a great part of his countenance. The man’s audacity is equal to anything : when he is in the tribune he holds his head as high as he can, and endeavours to assume an air of dignity. He cannot succeed in that, but amidst the exclamations and signs of disgust the look of approbation which he wears is wonderful : far from ever having the appearance of fear or of deference, he seems always to contemplate the Assembly, from the tribune, either with the eye of menace or contempt. He speaks in a hollow croaking voice, which, in such a diminutive figure, would almost produce laughter were it not suppressed by a horror at the character and sentiments of the man. When he attempts pleasantry it increases the horror which his appearance creates ; it gives something of the sensation which I imagine I should have if a murderer, after cutting a man’s throat by a dexterous stroke of a knife, should smile in my face and tip me the wink. Marat is shunned and apparently detested by everybody. When he enters the hall of the Assembly, he is avoided on all sides, and when he seats himself, those near him generally rise and change places. But nothing can disconcert him. I have never heard of any other of his good qualities ; but he certainly possesses

a great deal of courage, both personal and political: no danger can terrify him; his heart as well as his forehead seems to be of brass."

Is there a finer or more graphic picture in history than that which Dr. Moore drew from personal observation of a little villain, who, in spite of all, was a favourite with many, and who even gained a kind of blind affection as one who was so clever that his openly denounced misdeeds were glossed over by the cleverness with which they were evaded? "Il était un petit diable en pouvoir" was truly said of him.

A picture of Mirabeau is admirable; but Robespierre, by the strange contradictions of his nature, was a madman Moore does not seem to have comprehended. The picture is true as far as it goes, but lacks completeness and perspicuity.

Taking it all in all, the *Journal* of Moore is the best account I have read of the great Revolution. I believe I have read all the choicest histories of it, and I felt as I waded through Carlyle, missing no line and construing the meaning line by line, that his story was complete, and that nothing could be more vivid from the dead past. But this much simpler story of Moore has in it truer life, and carries the mind and heart nearer to the dreadful reality. It is the narration of one who was there, who guesses nothing he does not know, and, content to tell all he knows, tells no more. When he gives reasons for the Revolution they are not speculations; they are the reasons delivered to himself personally by those who were playing an active part in the astounding commotion. The temptation is strong to follow up further the character of our scholar as historian, but the task must end in this epitome.

The literary style of Moore is simple and clear, never wearisome and always enticing. He was a man of letters by nature, and his *Smollett* holds its own as firmly as the works of that illustrious author. If the time were at my command, and the means, I should feel it a delightful labour to republish the whole of the works of Moore in a cheap and popular form. They would, I am sure, be largely read at this particular time, both at home and abroad; for though it be true that the times change and we change with them, there is in his pages many a lesson that would be singularly appropriate at the present hour.

FINAL.

After his return to London, Dr. Moore kept the even tenor of his way, occupied steadily in his literary and professional pursuits. The

welfare of his children was his ever constant care. They well repaid his affection. John, the eldest, after distinguished service in Corsica and in Egypt, and after winning the love of all whom he with intrepid courage and skill commanded, died, as we know, a brave soldier in the hour of victory—the happiest death such a man can have.* James became a surgeon of considerable celebrity in London. He added to the literature of medicine, and proposed that new method of producing local anæsthesia, by pressure on nerves, described in the Life of Benjamin Bell. Graham entered the navy, and distinguished himself when, in command of H.M. ship *Melampus*, he took the *Ambuscade*, one of the squadron intended for the invasion of Ireland. Francis entered the diplomatic service, winning laurels there. Charles, the youngest son, won for himself distinction at the bar. Miss Moore remained single up to the time of the death of her father, an event which took place, after a lingering illness, at Richmond in the seventy-second year of his age, on January 21st, 1802.

Dr. Moore, say the friendly biographers who knew him during his life, “paid with resignation his debt to nature, leaving as example a life of integrity, and sons heirs of his virtues, who will, like him, consecrate them to the welfare of their country.”

Never was commendation of personal merit more truthfully expressed, never prophecy more faithfully fulfilled.

* My friend Mr. J. C. Roger, F.S.A.S., to whom I am indebted for many valuable suggestions in regard to Dr. Moore, directs my attention to a severe and very just censure in the *Edinburgh Review* on the famous author of *Don Roderick* for “grudging,” on political grounds, a single ray of glory “to gild the name” of this illustrious soldier. It was, indeed, very little of so great a writer as Sir Walter Scott to be guilty of so serious an omission.

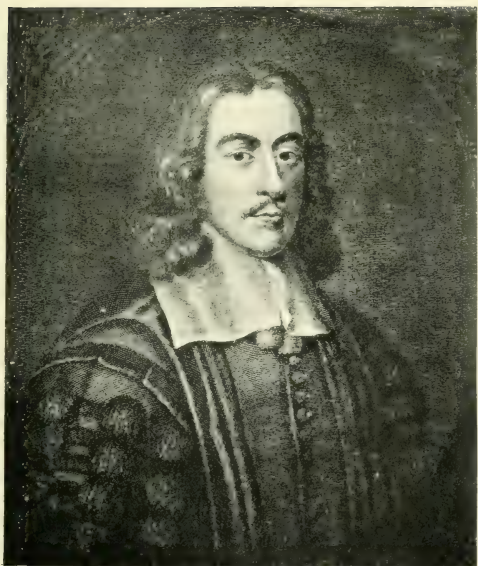
Thomas Willis, M.D., F.R.S.

WOOD, the quaintest biographer one can read in these days, introduces us to Dr. Thomas Willis in the following terms :—

“He was a plain man, a man of little carriage, little discourse, complacency, or society; yet for his deep insight, happy researches in natural and experimental philosophy, anatomy, and chemistry, for his wonderful success and repute in his practice, the natural smoothness, pure elegance, delightful unaffected neatness of Latin style, none scarce hath equalled, much less outdone him, how great soever. When at any time he is mentioned by authors, as he is very often, it is done in words expressing their highest esteem of his great worth and excellency, and he is placed still as first in rank among physicians. And, further also, he hath laid a lasting foundation of a body of physic, chiefly on hypotheses of his own framing.”

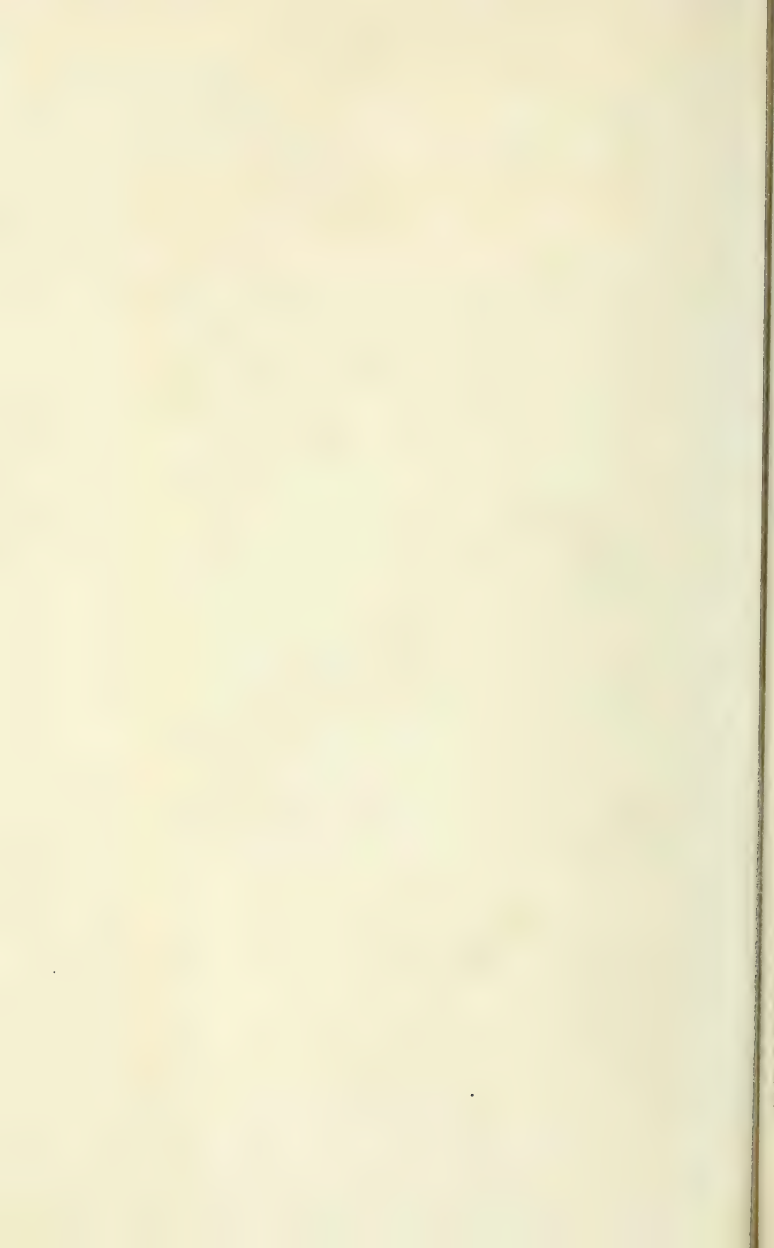
The illustrious scholar in medicine, thus introduced to us, came into this world at Great Bedwin, in Wiltshire, on January 22nd, 1621. His father was Mr. Thomas Willis, of that place, and his mother, Rachel Willis, was daughter of Mr. Howell. The family appears to have been well connected, and our scholar, who was the eldest son of his parents, was sent in due time to a Grammar-school under the mastership of Mr. Edward Sylvester, an eminent teacher in the parish of All Saints', Oxford. He acquired quickly a reputation for his advancement in learning, and in his sixteenth year, through the patronage of Mr. Thomas Iles, obtained a canonry in Christchurch and the membership of that famous college. Unremitting in his studies, he progressed rapidly, and on June 19th, 1639, graduated B.A., and on June 18th, 1642, M.A.

At this time the city of Oxford was the seat of the King's government. The loss of the battle of Edgehill had forced the unfortunate Charles I. to retire to the University city and to garrison himself



Thomas Willis

From an engraving by G. Vertue in 1743, from a painting then in the possession of
Browne Willis, Esq.



there. Here the King held his Court, and here, as Harveian scholars will remember, Harvey dwelt by the side of his royal master as the favourite physician. Willis, at the time, had not entered physic, but, like many other students of the university, took up arms for the King. One may imagine, however, that he came into contact with the discoverer of the circulation of the blood ; and, as will be seen when his works come under notice, he was deeply imbued with the knowledge of that discovery, and with the practical lessons that were likely to spring from it. These might have been the reasons why he began, even during his military career, to devote his spare time to the study of physic. He did so, and on December 18th, 1646, he graduated M.B. In 1646 Oxford surrendered to the Parliamentary forces ; Harvey left the service of the King to return to London, and Willis settled himself down in Oxford as a practitioner in St. John Baptist's parish. His house was situated opposite Merton College, and it is said of him that he "kept Abingdon market," by which is meant, I presume, that, according to the custom of his day, he visited Abingdon every market day, and prescribed for patients who might wish to consult him. In his house in Oxford he set apart an oratory, in which he caused to be conducted, daily, the service of the Church of England. Amongst his colleagues he had at this period John Fell, who likewise entered into the service of the King as a soldier, and became an ensign, but afterwards entered the Church, became Dean of Christchurch, later on Vice-Chancellor of the University, and finally Bishop of Oxford. Fell, in combination with John Dolben, who became in time Archbishop of York, and Mr. Richard Allistree, who was in later days Provost of Eton College, joined Willis in carrying out the liturgy and sacraments of the Church in the special room of his house to which reference has been made. The services were open to any who chose to attend them.

Willis continued in practice at Oxford during the period which terminated with the death of the King, and during the whole of the Commonwealth. It is a part of the glory of the Commonwealth that it allowed the partisans of Charles to practise their vocations without serious molestation. It is true it turned out distinguished men from official positions, Harvey himself being no exception to this rule ; but it did not interfere with private labours of a professional kind, like those of medicine. So Willis went on increasing his practice in Oxford until the Restoration in 1660. On the Restoration, Dr. Joshua Crofts, Sedleian Professor of Natural Philosophy in the University, was ejected, and on August 25th, 1660,

Willis was appointed in his stead. The next year he graduated Doctor of Physic, and added greatly to his professional reputation, being summoned, says one of his biographers, Thomas Birch, "to most of the people of quality about Oxford. In one of his journeys in April, 1664, he discovered a famous medicinal spring at Astrop, near Brackley."

Amongst his other friends of importance Willis numbered Sheldon, Archbishop of Canterbury, upon whose invitation he moved from Oxford to London in the year 1666. He chose for his place of residence St. Martin's Lane, and very quickly rose into eminence as a practitioner. He was at this time married, his wife being Mary Fell, daughter of Dr. Samuel Fell, Dean of Christchurch, and sister of the famous Dr. John Fell. By her he had four children—one son, Thomas, and three daughters: Jane, who in the year 1701 married Robert Symonds, High Sheriff for Herefordshire; Rachel, who married Robert Lingen, of Radhook, in Gloucestershire, and Katherine, who died in 1667.

In his mode of life Willis was extremely methodical. He rose in time to go to morning prayer at six o'clock in summer, seven in winter. In London he did not open a room in his own house for services, as at Oxford, but he arranged with the schoolmaster who taught in the vestry hall adjoining the church in St. Martin's Lane to read prayers in the church of St. Martin's morning and evening, so that the scholars as well as the general public might attend; and, the plan seeming to answer well, he paid the schoolmaster £20 a year in augmentation of his stipend for the services rendered, leaving him the same for lifetime. To the poor he was a most liberal benefactor, allotting always from his practice a part of his profits for charitable purposes. In the latter part of his life he devoted all the fees which he took on Sunday, and which amounted to more than those of any other day of the week, to deeds of charity. In 1664 he was made an Honorary Fellow of the Royal College of Physicians of London, and on November 18th, 1663, he had been elected a Fellow of the Royal Society, a society then in the days of its birth. He was not, however, admitted to the Royal Society until October 24th, 1667, an omission accounted for in the Journal Book in the following terms: "Dr. Willis was chosen, having been forgot to be chosen again at the time when, upon the renewall of the charter, the Council, according to the power granted them therein, did receive and admitt into the Society such persons as had been elected Fellows afore upon the first charter."

Willis probably stood at the height of his fame from the years 1667 to 1673, not a very long period in a London life, but brilliant for the time, his table being the resort of most of his eminent cotemporaries. He is said to have refused the honour of knighthood, but on what grounds there is no evidence. There is, however, a gossiping statement that the "Merry Monarch," Charles II., chose to make Willis the subject of his mirth, saying of him, in a thoughtless moment, "that he killed more of his subjects than an invading army"; it has been assumed that this observation rankled in the breast of Willis and even shortened his days. Perhaps for this reason he refused the courtly favour that was offered him.

Dr. Munk, quoting from Wood, says that Willis "became so noted and so infinitely resorted to for his practice that never any physician before went before him, or got more money yearly than he." Munk also refers to the peculiar and unfortunate relationships that Willis held with the King's brother, the Duke of York, afterwards James II. of England. James was married twice, first to Anne Hyde, daughter of the Chancellor, the famous Earl of Clarendon, by whom he had eight children, all of whom died except Mary, who married the Prince of Orange and ascended the throne with him, and Anne, who came to the throne as Queen Anne. Two years after the death of his first wife, Anne Hyde, James married Mary, the daughter of the Duke of Modena, from whom came the Chevalier de St. George, the first Pretender. Regarding the family of James by the first wife, Willis was consulted, with the result recorded by Bishop Burnet as follows: "The children were born with ulcers, or they broke out upon them soon after, and all his (the King's) sons died young and unhealthy. This has, as far as anything that could not be brought in the way of proof, prevailed to create a suspicion that so healthy a child as the pretended Prince of Wales could neither be his, nor be born of any wife with whom he lived long. The violent pain which his eldest daughter had in her eyes, and the gout which early seized our present Queen, are thought the dregs of a tainted original. Willis, the great physician, being called to consult for one of his sons, gave his opinion in the words '*Mala stamina vitæ*,' which gave such offence that he was never called for afterwards."

That the opinion of Dr. Willis was sound, events proved too faithfully. Poor Queen Anne, daughter of Anne Hyde and James II., gave birth, we know, to child after child (some say nineteen) that were incapable of life. This meant *mala stamina vitæ* without any kind of doubt, but perhaps the stern and honest physician was too

outspoken. He cared little, we may be sure, for courtly favour, and, as a staunch Protestant, cared nothing for the favours of an enemy to his faith.

THE WORKS OF THOMAS WILLIS.

Considering the comparatively short time at the disposal of Willis, it is astonishing what an amount of work he performed. He left treatises on eleven subjects: (1) Fermentation; (2) Fevers; (3) Urines; (4) Ascension of the Blood; (5) Muscular Motion; (6) The Anatomy of the Brain; (7) Description and Use of the Nerves; (8) Convulsive Diseases; (9) Rational Pharmaceutics; (10) The Scurvy; (11) The Soul of Brutes—this last in two discourses.

As we enter into the study of the labours of Willis it is necessary, for a moment, to recall the condition of medical science and literature in the period during which he flourished. The period was critical. Anatomy had made splendid advances, and physiology had so far progressed, that under Harvey's demonstrating hand the circulation of the blood was acknowledged as a fact beyond dispute. The discovery by Aselli of the "lacteal system" had also been accomplished, and by this time the practice of medicine had commenced to rest on the bases of anatomy and physiology.

Another element of science was now being added. Chemistry, which had for some centuries been cultivated in a sublime obscurity, was at last beginning to take form and shape and to promise to be a guide to the dispensator of curative substances. Willis was one of the early men to recognise this development; and, bearing in mind the few opportunities he possessed and the many mysteries he had to dispel before he could arrive at anything like the light of truth, we may almost consider him the chemist of his time.

Connected with the minuter studies of anatomy there was just at the moment coming into first use the microscope, with which instrument of research he was familiar.

Antony Van Leeuwenhoek, born in 1632, would be about thirty-five years of age when Willis was writing the essays, in which he tells us that he used the microscope. What kind of instrument he used is a mere matter of inference; it was, I think, nothing more than a lens, since he himself defines the word "microscope," in a table of hard words derived from the Greek and Latin, in the following manner: "Microscope—*A perspective glass to behold minute and very small bodies; a magnifying glass.*" Whatever he used, it answered his purpose well, as his plates bear witness. I should suppose his

instrument magnified about forty diameters, and he certainly was one of the first English physicians to use the microscope for medical research.

There is one other point, reserved as the most important of all, connected with his philosophical labours and his discoveries : he was the founder of the physiological anatomy of the brain. He had learned, no doubt, from preceding authors the general anatomy of the brain, but he established the mode of examination of structure in brain, cord, and nerve, which has remained a foundation unto the present hour. We get from his labours terms which carry his name without challenge ; witness one only : "the circle of Willis."

How difficult he felt it to be to enter upon the labour to which he subjected himself is most ingenuously conveyed in the close of the Preface of his first medical philosophical discourse on Fermentation, which he gave to the world in 1659 :—

"As to our method and manner of philosophising, no man can blame me if I should not here describe all things according to rule and analytic patterns, because in this work it chances for me to wander without a guide or companion in solitary places, and as it were in a solitude trodden by no footsteps, where I not only make a journey, but my way also ; therefore, whenever I deviate, I cannot be said to err among right judges of our endeavours, who have no path in which I should walk, nor could find a track which I might fear to miss."

The above observations refer specially to the philosophical bearing of the genius of Willis. It must not be forgotten, at the same time, that he was a practitioner, and that his works consequently are likely to be enriched with good clinical instructions. His works *are* so enriched, and there are many portions of them of a purely practical kind, for which I must reserve a special section. It is now time to proceed, in a sectional manner, to descriptions of certain of his labours according to the nature of the studies to which he lent his faithful and industrious mind.

ANATOMICAL WORK.

Thomas Willis may be considered, in the first place, as an anatomist ; and, as an anatomist, he must be considered as the leading great expositor of the structure of the brain, spinal cord, and nervous fibres. Strange as it may seem to some modern ears, it is nevertheless true that no man, even in these days, can get a sound

and deep knowledge of the cerebral and nervous structures unless he first master this master, and learn how this master set himself to work in his labour as told by his own pen. He determined "to rely on this one thing : not to pin his faith on the received opinion of others, nor on the suspicions and guesses of his own mind ; but, for the future, to believe nature and ocular demonstrations." Therefore he "betook himself wholly to the study of anatomy," and did "chiefly inquire into the office and uses of the brain and of its nervous appendix." He addicted himself "to the opening of heads of every kind, to inspect as much as he was able, and from the contents to study the exercises, defects, and irregularities of the animal government, that so a firm and stable basis might be laid on which not only a more certain physiology than could be gained in the schools might be laid, but on which also the pathology of the brain and nervous stock might be built."

In his anatomical work Willis was, fortunately, aided by two of the most remarkable men of his time—namely, Dr. Richard Lower (*tuberculum Loweri*) and Dr. (later on Sir Christopher) Wren, then Savillian Professor of Astronomy at Oxford and afterwards the immortal architect of St. Paul's Cathedral. To the aid he received from these men of splendid genius he was, he tells us, much indebted. Lower was indefatigable in the dissection of the nerves, and Wren, with his own hands, executed many of the delineations with which the dissections were illustrated. In addition, Dr. Thomas Millingen and Dr. E. King lent their thoughtful and able assistance, the whole seeming to form what we, in these days, would call a committee of inquiry into the greatest of all the problems of the animal economy and some of the highest problems in the whole domain of natural science.

Anatomy of the Brain.

In describing the brain Willis naturally commences with the enveloping membranes. Following Hippocrates and Galen, he recognises two membranes only—namely, the dura mater and the pia mater. At the same time he seems to think that the dura mater has two surfaces. Before his day there had been a contest on this subject. Realdus Columbus had declared for two upper membranes, asserting that he had separated the dura mater into two parts. To this statement Laurentius had replied that, though there seemed to be two parts, there was really only one, adducing in support of his

argument that, although there were two layers of peritoneum, there was only one membrane. Willis, without entering into the discussion, appears, in a certain sense, to have entertained a similar view, for he assigns to the dura mater two distinct duties: one of protection by its outer, the other of secretion by its inner surface. He describes the anatomy of the membranes, dura mater and pia mater, with great skill and care, and his account of the choroid plexus as a kind of lamp suspended in the chambers of the brain is at once as practical as it is poetical.

The mode in which the brain is fed with blood, and the picture of the arterial circuit to which his own name has been always attached since the publication of his essay, is felicitous, as is the description of the return of the venous blood through the sinuses and the mode in which, delayed in its course, it is so perfectly regulated that there shall be time for secretion of the water of the brain, and that without any undue pressure. The vessels are defined by the pencil of the artist, as well as by the pen of the writer, and little has remained for the future anatomist to do in the matter of amendment of this exposition of the cerebral circulation. The division of the cerebral nerves formulated by Willis is practically the same that holds good at the present hour. He gave as divisions nine pairs of cerebral nerves, although he is generally credited with giving ten. His divisions into pairs are—(1) the olfactory; (2) the optic; (3) the *motores oculorum*; (4) the pathetic of the nerves of the eye; (5) the fifth pair "having a large province," distributed to the mouth, palate, and face; (6) the sixth "a pair of small nerves going to the ball of the eye"; (7) the seventh pair "the auditory or hearing nerves, and their two processes on either side of them"; (8) the eighth pair the wandering pair, consisting of many fibres; (9) the ninth pair consisting also of many fibres, which, tending downwards, grow together into one trunk. To these he adds one more pair, the tenth, "consisting of many fibres and carried to the muscles of the neck." "But," he says, "it is doubtful if this pair ought to be called the last of the skull or the first of the vertebrals." The division, throughout, is excellent, and although we have modified it by linking together the glosso-pharyngeal, the *par vagum*, and the spinal accessory as the eighth pair, and by making the hypoglossal the ninth pair, it is exceedingly doubtful whether we have not diverged for the worse in departing from the Willisian classification. When we come to the description he supplies of the brain substance itself, it is curious to find the *cerebrum* defined as the brain, and the

smaller brain, carefully depicted with the tree-like figure of the arbor vitæ, as the cerebel. The medulla oblongata is defined as if it had been specially detected as a distinct part by the anatomist himself. The medullary and the cortical structures of the brain are differentiated, and many of the individual parts that make up the mass of the cerebrum are named. The divisions of the brain, we are told, are: "(a) the two hemispheres and the two lobes or partitions of either; (b) the narrow cranklings, turnings, and windings, or the gyrations and convolutions, or rolling together of the brain; (c) its double substance, viz., cortical and medullary; (d) the common basis of all, viz., the callous body; (e) its subtension or fornix; (f) the appension or circuit of the brain over and above the oblong marrow; (g) and, what results from thence, the void space or ventricles made by its infolding together."

The description of the hemispheres of the larger brain, called by Willis the brain, is very ably supplied, if quaint and somewhat involved and figurative language be excused as peculiar to the style of exposition current in his school. He gives excellent directions for dissecting the brain, and expatiates on the different parts with a keen view to function. Then from the brain proper he passes to the oblong medulla, which he looks upon as a wedge-like centre of intercommunication between the posterior base of the great brain and the cerebel, or little brain, and the spinal cord or marrow. He shows himself to be conversant with the pons, or protuberance which binds all these parts together, and he is particular in describing the medulla as the base with which the hemispheres of the big and little brain are connected. The position, form, and structure of the cerebel are pointed out, and the relationships of the cranial nerves to the cerebel are thoughtfully defined.

When he comes to the anatomy of the spinal marrow and to the distribution of the nerves throughout the body, Willis is seen at his best. He had here to help him the skilful hand of Richard Lower, and the advance in anatomical science which was brought out by their labours must have come as a revelation. The first four pairs of nerves arising within the skull are made the subject of a separate chapter; then the origins and courses of the fifth, sixth, and seventh pairs are unfolded; and from them attention is turned to the eighth pair, the par vagum, the wandering nerve. It is but fair to preceding anatomists, Vesalius especially, to say for them that they had paved the way towards a correct investigation of the course of the par vagum, and that they had given it the name of "the wanderer."

But the admission does not detract in the least from the part which Willis took in the field of further discovery ; on the contrary, what he has written on the subject shows how much he was able to clear up and take out of doubt. His predecessors had mixed up the course of this nerve with the branches of other nerves that joined with it in its ramifications. Willis corrected the error and traced the nerve throughout all its course by its own line of fibres. He follows these fibres downwards in their course to the heart and to the pulmonary organs ; says the fibres are distributed together with the blood-carrying vessels through the whole substance of the lungs, where in their passages, step by step, they run with the pipes of the bronchia, the arteries, and the veins ; and, many shoots being set forth on every side, they climb upon and compass about these vessels. The trunk of the wandering nerve, descending on both sides, nigh the sides of the trachea, distributes also many shoots into the coats of the œsophagus, and in the further descent of the fibres of the nerve into the stomachic region distributes itself to the viscera.

The course of the spinal accessory nerve is followed with equal care ; and, with much nicety, the nerve of the diaphragm is traced from its cervical and brachial origin down to the diaphragm. The work on the nerves concludes with a chapter, finishing the series rather abruptly, on the blood-vessels to the spinal marrow.

Of the Organs of Breathing and their use.

The anatomy of the respiratory organs is given by Willis as a part of his treatise on the operation of medicine on human bodies, or *Pharmaceutice Rationalis*, and is another effort remarkable for its accuracy, and for the beauty of the plates with which it is enriched. The chapter remains to this moment a valuable contribution not merely to the general anatomy, but to the minute anatomy of the pulmonary organs. The descriptions of the lung tissue, of the pleural covering, of the lobes, of the lobules, of the two circulations, and of the nervous supply, are admirable ; but it is when we come to the minute structure that our admiring surprise is most pronounced. The preceding work of the illustrious Malpighius is freely employed to illustrate the essay ; but other work, strikingly original, is also added. The vesicular structure of the lung tissue is finely depicted, and a plate of the lymphatic ducts "creeping through the superficies of the lungs, as seen in the warm large lobe of the ox and expressed to the life," could not be surpassed by our modern artistic

skill. The four coats of the trachea and of the bronchial tubes are explained; the circular muscular fibres forming the contractile muscular coat are traced down to the finest ramifications; and the stronger muscular organs which work to accomplish the acts of breathing are equally well expounded. In brief, the more carefully we read these pages on anatomy, the more we are impressed with the advanced learning and fine discrimination of the author.

The Primæ Viæ, or First Passages.

The description of the uses and affections of the part in which medicines first begin to operate—namely, the alimentary canal—is not so striking as that on the respiratory system. Still there is in this instance also much that is original and progressive. All the intestinal organs receive their proper share of attention, and the stomach is depicted in plain and simple style. The muscular coats of the stomach, longitudinal, circular, and oblique, are well drawn. The outer coat or covering, with its vascular network, is exhibited; and the inner or mucous coat is also exhibited so as to display the folds, or, as we call them, rugæ, the nervous and vascular supplies, and the glandular surface.

The anatomical labours of Willis, thus briefly referred to, might be largely extended; but enough has been rendered to indicate the industry and care with which he proceeded in his task. That there are many and serious omissions must be admitted: as, for example, the omission of the liver, the kidneys, and the pancreas, about the structure and functions of which he makes little mention. We may infer that he left these and other anatomical exercises alone for the simple reason that, as he had not sufficient time at his command for the study he felt necessary before he could descant on them and their uses, it was better to leave them—a wise and proper course.

Physiological Works.

The works of Thomas Willis in the physiological department of medical learning are more original and remarkable than the anatomical. They display genius of the highest order. I doubt if Harvey himself stands in any degree superior to his younger cotemporary. He preceded him, and therefore may be considered as the master; and, indeed, there are indications on every physiological page of the younger man that he had imbibed the spirit and the style of his illustrious predecessor. But when we come to the

question of genius, the equality of the two men is best seen. It was unfortunate for Willis that no grand problem like that of the circulation of the blood lay before him ready for birth. Had there been, he was just the man to have unravelled the final skein, and revealed the truth. As it was, he laid himself out to approach a new subject of infinite complexity and novelty, and so become a pioneer of the earliest type, instead of a traveller at the close of a series of discoveries on a main line of discovery.

Physiology of the Blood.

Two physical and medical exertations, one on the *Ascension of the Blood* and the other on *Muscular Motion*, lead the way in the purely physiological department of Willis's labours, and open up ideas that are positively fascinating from their innocent lisping of the most advanced modern truth. The heat of the blood is represented as like to a fire or vital flame. But how is the vital flame kindled first in the blood? "The small beginnings of it are laid up in the conception itself, in the genital humour, as a little spark stricken and hidden in a convenient manner, which, being from thence raised up by the mother's heat, begins, little by little, to glow, and, afterwards dilated with the blood brought forth, and leisurely increased, is equally extended with the body which it actuates and animates. For a season this newly lighted body burns like a brand under cover, sustained by the heat or glow of the mother; but as soon as it is born and begins to breathe the vital fire largely unfolds itself, and heat being raised through the whole mass of blood, it enkindles a certain flame, and, because the blood first rushes into the lungs, having there got an accession of air, begins to burn." The blood itself undergoes a notable alteration, "for what did flow of a dark purple colour into the pneumonick vessels from the right side of the heart, returning from thence, presently out of the lungs becomes crimson and, as it were, of a flame colour, and so shining, passes through the left ventricle of the heart and the appending arteries."

To Willis may, I think, be accorded, from this passage, the primary step of the discovery of the aëration or oxidation of blood; and when he makes, immediately, another step, he signals yet another new truth. The blood rekindled passes all over the body with a perpetual and equal flame, and successively renews its burning in all its particles. It ought therefore to be carried about by a continuous course from the "nest of its ascension" into all parts. For this end the machine

or engine of the heart is necessary, as a pin or clock, which, being made with a double bosom, might receive within itself, from the whole lungs, the blood fresh-enkindled, that it might drive it forward, thus enkindled, into every part of the whole body, and might then receive the burnt and half-extinguished blood, returning from the whole body, imbued with new and inflammable juices, and might deliver it to the lungs to be rekindled.

How well the heat-giving course of the blood is here described will be manifest to every reader who has studied the subject; but even that description is surpassed by another in which the function of the heart is defined and limited. The heart, although a mere muscle and exercised only with an animal motion, seems, he teaches, to serve alone for the circulation of the blood. But it does more: it so much helps to moderate the ascension of the blood and its burning under the rage of the passions, and so directs the other works and uses of the animated body, that we have thought the vital or fiery part of the soul must have its chief and, as it were, imperial seat in the heart and lungs in every distemper or affection, as of grief, joy, or fear, and also in paroxysms of disease. Hence it happens that the blood flowing into the heart fluctuates and is enkindled with divers impulses. The argument is subtle, and even to this day a novel reading of cardiac disturbances from external impressions and impulses as well as from internal perturbations and storms acting on the blood in its circuit. The heart is a mere muscle: it does not itself feel; it is a machine which regulates movement, and, by its passive movement when left to its own tasks, it is independently mechanical. But bring unnatural impulses to bear upon it, force it out of its daily course, and then it becomes a disturbed centre that "feels" to be the cause of the disturbance. It is not the cause, but it feels to be so, and, as a consequence, we say, unwittingly, it is the cause. So an ignorant person looking at the perturbations in the balance-wheel of a timepiece would attribute, knowing nothing of the mainspring, any aberration in the going of the piece to the balance-wheel, as the primary cause of the aberration.

The Animal Fire and Muscular Motion.

He treats through many passages on the subject of the animal fire. He admits that blood will not burn like a lamp, but he considers this no objection; for does not rotten wood burn without manifestation of flame, by a slow burning, and why not blood?

In burning, blood too may give off a smoke or air of combustion, although it be an invisible air. Life, in short, is a combustion, a living fire, and the blood is a living fluid, in the living body, so long as it is in motion.

The chapter on muscular motion is full of interest. In order to have muscular activity, there must be three factors: firstly, the original of the action, or the first designation of the motion to be performed, that which proceeds from the brain; secondly, the instinct or transmission of the thing begun to the motive parts, and which is through the nerves; thirdly, the motive force itself or exertion of the spirit implanted in the moving parts either into a contractile or an elastic force. As to the original or beginning of the muscular motion, which proceeds from the brain, that is one of two kinds, which may be called voluntary or involuntary. If the origin be in the brain proper, namely, from the great hemispheres, the motion is under the will or voluntary; if the origin be from the cerebel or little brain, it is involuntary, the function of the cerebel being to act as the centre where the law of nature resides, and to govern such natural acts as respiration, arterial circulation, intestinal movement, and all such functions as are "according to the solemn rites of nature."

Respecting the phenomenon of contraction of muscle he makes some admirable observations. He says that as often as the motion of a living muscle was beheld by him he could conceive and collect no other thing than that certain elastic particles did rush into the fleshy fibres from the tendinous ends and did intumify and force themselves nearer to each other, or together; then, the same particles presently coming back from the fleshy parts towards the tendons, the relaxation of the muscle happens. In a bare muscle, when he had separated every fleshy fibre or a company of them, apart from the rest, he could plainly discern by the microscope the tremor begin at either end of the flesh, and pass towards the middle. Further, each fibre being tied about the middle, while yet compacted with the others, was contracted or drawn together; but a ligature being placed round it, near towards its two ends, it remained flaccid between the two ligatures. He then placed two ligatures at equal distance between the middle and the ends of the same bundle of fleshy fibres, which being done, a rising and contraction from the tendinous ends took place up to the points ligatured, but went no further, the middle part between the ligatures remaining unmoved and flaccid.

Physiology of the Nervous System.

It is to be expected that one who paid so much attention to the bare anatomy of the nervous system, as did our present anatomist, should have much to say about the physiology of the brain and its subordinate parts. He has much to say, enough to form an essay of itself, instead of the brief abstract I am able to present. Of the brain, meaning what we now designate the cerebrum, he declares that he accounted it the chief seat of the rational soul in man, and of the sensitive in brute beasts, and indeed the chief mover in the animal machine, the origin and fountain of all motions and conceptions. But some functions do chiefly and more immediately belong to the substance of the brain, while others depend, as it were, mediately and less necessarily upon it. Imagination, memory, and appetite, he conceives, depend immediately on the brain proper. The rest of the merely natural faculties, as sense and motion, also the passions and instincts, though they depend in some measure on the brain, yet they are properly performed in the oblong marrow (medulla oblongata) and cerebel.

He had a very good notion on the functions of the convolutions. He looked upon them as folds for the extension of surface of the cortical substance. The "anfractuous or crinkling brain" is, he thought, "like a plot of ground planted with nooks and corners, and dawks, and molehills, for a more ample extension than if its superficies were plain." He explains how to unfold the convolutions by removing the pia mater, and he suggests that the involutions of the pia mater, by dipping deep down into the cortical matter, supply the cortical matter the more freely and copiously with blood. Of the two kinds of brain substance he speaks correctly. The cortical is the receptive surface, the surface which receives impressions; and the medullary, or white substance, is the conducting structure from which the conveying nerves proceed in their course. He was conversant with the fact that the arterial ramifications are attended throughout by nervous filaments; and although he does not appear to have dissected out the sympathetic ganglionic system, he treats of ganglia as if he had some inkling of a ganglionic chain connected with the cerebro-spinal nervous network in the viscera.

The Nerve of the Diaphragm.

There are numerous other passages of a physiological nature which deserve to be introduced into this section on the works of

Thomas Willis. I must be content with one other extract as illustrative of the ingenious reading of this, in his generation, unique scholar. He is treating on the functions and uses of nerves, and is brought to the explanation of the nerve which he calls "the nerve of the diaphragm," the phrenic, as we now call it; and thus he reasons. We ought to inquire concerning the nerve of the diaphragm why it always proceeds from the brachial nerves and why it does not rather arise immediately from the spinal marrow. The reason, he thinks, is that the motion of the arms must have some reciprocal connection with the motion of the diaphragm by a certain respect or habitude. The arms or fore-legs of all creatures are made for labour or hard exercise. But under too much labour the act of respiration is very much increased, so that the breath almost fails and is in danger oftentimes of being lost, because too much blood is forced into the heart, and would oppress it, if frequent and laborious respiration were not instituted. Therefore, that the exercise of the body may be regulated according to the state of the præcordia, that the motion of the arms may observe the action of the diaphragm, it is provided that the nerve of the diaphragm should be tied, as if it were a bridle, to the brachial nerves, and so timely warn them, if unmindful of their duty, and as soon as the breath begins to fail command them to desist from further moving the body. So when cattle are overdriven, urged beyond their strength, there follows, in them, injury of the heart or diaphragm; and when horses are driven too rapidly with the stomach loaded, there follows permanent difficulty of breathing, because the nervous tone of the great respiratory muscle is broken.

PRACTICAL AND THERAPEUTICAL WORKS.

We have seen that Willis was considered by the world in which he lived in the light of a renowned practitioner of the healing art. It is quite certain that he was fond of the practice of his profession, and it was for the advancement and practical development of it that he resorted to anatomical and physiological pursuits. As the work of William Harvey on pathology was unfortunately lost, we cannot tell how far Harvey may be credited with original quality of practical skill; but we have the best evidence that Thomas Willis was in the most eminent degree qualified in the treatment of disease, and that, as far as his lights were bright, he stood in advance as a bearer of them. It was the one grand object of his labour to place the art

of medicine on a rational basis. He learned structure, he learned function, that he might be sound in the detection of disease, in the symptoms which mark out the courses of disease, and in the methods by which diseases may be prevented or cured. The physiological process is the introduction to the practice. That is the rule wherever he speaks either on prevention, nature, or treatment of disease.

In every sense he was a general physician, but, unlike Harvey, he seems to have held himself to the practice of medicine as distinct from that of surgery. The surgeon would be to him a skilled hand whom he might call in to his aid, as he would have called in a mechanic to repair his timepiece or his house. We deal, therefore, with him as with a physician pure and simple, the head of his profession in the time of the Commonwealth and immediately after the Restoration ; a physician accomplished in the theories of his day and skilful in practice.

On Fevers and Agues.

He has a work on fevers, and specially on the fevers called intermittents or agues. They were the rich fields of practice, both for the great physician and for the poor apothecary. His theory about all fevers was that the pyrexial condition is a condition of ferment or fermentation. The zymotic theory of febrile diseases is not more firmly engrafted into the mind of the physician of to-day than it was into the mind of Willis in 1662. Every paroxysm of ague is a fermentative perturbation, and the symptoms are so well described, a student still at his studies might learn the history of the affections in all their typical forms as well from Willis as from the most modern writer. As to treatment, what he tells us is memorable because it introduces to us the then newly discovered remedy for agues, Peruvian barks. He had been accustomed to treat ague most usefully by emetics, with a favourable idea of an empirical plan of firmly compressing the radial arteries as the paroxysm was approaching, so as to lock out the circulation from a part of the body, and retain the blood there for a time. But later the use of the Peruvian bark came before him, and he began to try its value. It did not, in his opinion, prevent the recurrence of the paroxysms at once, but it was the only "alexiterion or corrective poison" for a quartan fever. He administered, for a dose, two drachms of the bark infused, for two hours, in sack or white wine in an open vessel.

The descriptions left by Willis of the pestilential and putrid fevers

which were so prevalent in London in his day, and his accounts of the camp fever which affected the armies both of the Parliament and the King, are so absorbing, historically, I dare not here enter on them lest I be led into too long a story; but I must refer briefly to his *Description of a Catarrhal Fever Epidemical in the Middle of the Spring in the Year 1658*. The spring coming on, an intermittent tertian fell upon some. About the end of April a distemper arose suddenly as if sent by some blast of the stars, which laid hold of very many at once, so that in some towns in the space of a week above a thousand people fell sick together. The first symptoms were those of a catarrh, accompanied with a feverish distemper, joined with heat and thirst, want of appetite, a spontaneous weariness, and a grievous pain in the back and limbs. The fever, however, was more remiss in some, so that they could go abroad and follow their affairs in the time of their sickness, but complaining, in the meantime, of want of strength and of languishing, a loathing of food, a cough, and a catarrh. Some were afflicted with much more severe symptoms, and many died; but those that died for the most part died by reason of the strength being leisurely wasted, and a serous heap gathered more and more in the breast with the fever much increased, and with a difficulty of breath, as in those sick of a hectic fever. The disease was specially severe and fatal to persons who were advanced in life, and who were enfeebled, while the more strong and those of a healthful constitution recovered. Concerning the disease, he wonders what "procatartic" cause it had that it should arise in the middle of the spring suddenly, and that the third part of mankind should be distempered of the same in the space of a month.

The disease thus described was, of course, none other than the disease lately raging amongst us, which we call influenza. We could not even now draw a more faithful picture of it, nor could we perhaps give a more lucid hypothesis of its cause, although it be admitted that the hypothesis is too vague to be quite satisfactory. As to treatment, he teaches that when the disease is slight no treatment of an active kind is necessary, because it is the tendency of the affection to get well of itself; but when the affection becomes serious, when the breathing is oppressive, and when the heart is burdened with blood and enfeebled, then active measures must be taken; and the circulation must be relieved by the abstraction of blood, and by the administration of diaphoretic remedies, "for the vessels being emptied by this or that means, both the immoderate

heat of the blood and the abundance of the serum are restrained." Not a bad argument for a physician physiologist, who saw that liberating a strained organ, even by removing blood from it, might be the surest mode of giving quick relief. We should relieve an inanimate engine in that manner now, and successfully.

Intermittent Pulse and Circulation.

Diseases affecting the heart and lungs occupied closely the time of Dr. Willis, and all that he writes on these diseases has a value of its own not easily described. Why he did not discover mediate auscultation is a marvel, for he was near to it. He listened, at a distance, to the beats of the heart, and commented on what he heard. He was conversant with the phenomenon of intermitting pulse, and distinguished intermission from palpitation. He was also of opinion that there may be exceptional instances in which an artery may intermit in its beat whilst the heart itself is not distinctly intermitting; but he held, as a general rule, that the intermission of the pulse is due to the intermission of the arterial propelling stroke of the heart. The pulse intermits because the contraction of the heart is, for a time, suspended, and the "pause or rest" of the heart is twice as long as it ought to be. This defect of the heart is, he says, in its nature various. Sometimes the intermission occurs regularly, say at the third, fourth, or fifth beat; sometimes it is uncertain or fleeting. The vibrations of the artery are usually strong and brisk enough, but occasionally the first beat after the intermission is strongest, the next one less powerful, and so they grow less and less, insensibly, until the intermission occurs again. The cause of the intermittent pulse depends, he thought, not upon the blood, nor upon the heart itself, but upon the irregular conveyance of the animal spirits out of the brain into the nerves belonging to the heart; "wherefore when the stock of them is deficient the motion of the heart ceases ever and anon, for one beat, till, the supplies of spirit being reinforced, its action may be renewed." In illustration he says, "I have seen a mill that was driven about by a small stream when the water fails, and is almost exhausted, stop for a little while, and then, when the stream rises, immediately repeat its rounds and go on again." Was ever a more perfect or more simply expressed explanation of a heart failing from nervous default given to the world? When the intermittency is very marked, they who suffer from it may, he continues, experience headache and

giddiness, and may often be subject to what is called nightmare, and sometimes apoplexy. Yet as a common thing the affection is inconvenient rather than dangerous. In its treatment diet plays an important part, and, in the autumn, especially, a small course of physic should be prescribed. Such is his wise instruction.

Coughs and Diseases of the Lungs.

Concerning diseases of the lungs he sets out by saying that cough has for its first cause an irritation of the nerves belonging to the lungs, which irritation may be from the bronchial surfaces, from the lungs themselves, from nerves at a distance but in communication with the nerves of the lungs, or from a central disease or irritation in the brain itself. He is very full on the subject of consumption of the lungs, emphasising the doctrine that it descends by heredity, and yet showing that it may be kept from development, even in the predisposed, by avoiding impure and overcrowded air. Some of his means of cure are crude enough, as, for example, when he prescribes snails and snail syrup; but there is one line of treatment, by way of inhalation, which he names, and which ought not, in these days, to be forgotten. He orders the inhalation of the vapour of burning sulphur, combined with frankincense and mastic, to make a *troch*, that can be burned and the fumes inhaled. Again, in the same direction he prescribes arsenical inhalation, by means of a *troch* consisting of:—White Amber and Olibdanum, of each two drachms; Prepared Orpiment (sesquisulphuret of arsenic), half an ounce; Styrax and Labdanum, of each one drachm and a half; Solution of Gum Tragacanth, sufficient to make a *troch* for fumigation. One more curious word on this head. He tells us that it was a custom, sometimes attended with good success, “to prescribe the smoke of arsenic sucked into the mouth, like tobacco kindled in a pipe; or to burn, like tobacco in a pipe, little bits of cloth stained with arsenic (such as wherewith the walls of taverns are hung), and to suck the smoke into the consumptive lungs for cure.”

It would afford me much pleasure, and give, I think, equal pleasure to readers, to follow out much further the practical part of the work of our present author. He has an essay on *Scurvy*, which brings into a kind of new life one of the too common diseases to which our forefathers were subjected. He has also an essay on *Gout*, another on *Convulsive Diseases*, another on the *Operations of Medicines on Men's Bodies*, and more still that would yield excellent

mental food ; but were I to go on, I should not know where to stop, and so I must even rest here from what is so interestingly practical, and come to a final page bearing on what some consider the noblest part of this master, namely, his part as a natural philosopher, as well as a physiological physician.

PHILOSOPHICAL WORKS.

De Anima Brutorum.

The great and what we may truly call the philosophical work of Willis consists of his treatise concerning the *Souls of Brutes*, and is known amongst scholars as the *De Anima Brutorum*. The book was written as a diversion from a great affliction, the death of his "dear wife." In its composition he was much helped, being himself almost always interrupted through practice, by the famous and skilful anatomist and physician Dr. Edward King, and by his intimate friend Dr. John Masters, "skilful in physic and anatomy." The treatise is divided into two parts : the first is physiological, showing the nature, parts, powers, and affections of the soul ; the second is pathological, unfolding the diseases which affect the soul and its primary seat, namely, the "brain and nervous stock." The whole is dedicated to Gilbert, Archbishop of Canterbury (Dr. Sheldon), and to the vice-chancellor, doctors, and masters of Oxford, "who diligently profess, greatly adorn, and happily promote, good letters in the most famous university."

It is obvious from the tone in which this treatise is introduced and carried out that Willis looked upon it as his chief endeavour, his one grand and distinctive cast in literature, as well as science. It is touched, all through, with infinite care, and the copper plates with which it is enriched are worthy of modern art. It is, moreover, a glance at the whole economy of living things to the extent knowable by him and his compeers, a glance no man need be ashamed of in any age. In it, industry unites with insight, and breadth of knowledge with depth of understanding. To all he has added splendid learning, mastery of what has gone before, fine criticism, and generous acknowledgments.

The argument of the book is that in both man and brutes there is a sensitive or corporeal soul, which is of the same nature and quality in man and brute, but that man is endowed with another and distinct soul, called the mind, or rational soul, a something higher and eternal.

The corporeal soul belongs to the flesh, and leads men, like lower animals, to sensual pleasures ; whilst the rational soul, being helped by ethical rules or Divine favour, invites to good manners and to works of piety. But the corporeal soul can torment the flesh, and extending its influence, can even torment the rational soul, so that "the flesh lusts against the spirit and the spirit against the flesh," as Plato and Paul have each declared in their respective ways. Most curious it is to see how near he always sails towards our own fresher and yet older knowledge, and how, while holding by the ideas of his time, and influenced by them, he puts forward what have been the discoveries or re-discoveries of later men. In his chapter on the species and differences of brutes according to their different parts, he shows himself a good comparative anatomist ; and, in a description of the earthworm, he shows how careful he can be in the comparisons he draws on the various constructions of animal bodies. The plates also—copper plates—are notable for their fidelity. As a cerebral anatomist and psychologist he stands a head and shoulders above all his compeers and many of his successors. Gall himself might almost have envied him in his delineations of the diverging fibres of the brain. It is, however, on the question of the two souls that Willis is most impressive ; and although we, who now understand that the higher intelligence of man over the brute flows from the nobler and higher development of the brain of man, and that man is dual because he has two cerebral hemispheres—although we can see where he probably missed his way, we can equally well admire his fine and subtle application of the hypothesis he introduced. It is not a bad working hypothesis, and for one who lived when belief in witchcraft and cures by royal touch were accepted as real truth, what he advanced was consistent on the precedents of the case, and logical. The man, so he argues, has two souls, the corporeal and the rational ; the brute has one soul, and none other, namely, the corporeal. But the corporeal soul governs a long and necessary range of corporeal acts. It is the soul of the passions ; it is the soul that perceives ; it is the soul that excites appetites and mere mechanical, rhythmical, and automatic actions ; it is, in a sentence, the animal as distinct from the reasoning soul—soul of ratiocination. It influences the body, and makes the body do what is, or may be, visible to other souls looking on. But it does more, or it may do more. It may interfere with, or conquer, or be subservient to the reasoning soul. Here, therefore, is the dual man, here the distinction between the reasoning mind and the mere automatic mind. He refers to a youth

—a fool—living in his neighbourhood, who, although silly and foolish, yet knew exactly the interspaces of the hours, and, like a clock, called out each hour at the right moment. This was the automatic voice of the sensitive soul in one in whom the reasoning soul did not exist, or existed so faintly that it was without influence, as it is in lower animals, which, by repetition, do the same acts over and over again, until they become automatic in their actions.

The sensitive soul is the most powerful, according to this argument, in the majority of mankind, but sometimes this is not the fact. The rational soul may dominate and keep the animal soul in feebleness. Hence strong and wise men are not begotten of strong and wise men. In this respect, as if for a safeguard, Nature brings man down to the animal for his new life. "When the rational soul becomes greatly solicitous in bringing forth its child, the work of the intellect, then the corporeal soul, being called away to wait on the rational, becomes, not at all, or at most weakly, prolific. Again, a body in which the corporeal soul is brought low from old age, drunkenness, effeminacy, or privation, is a body that begets only languishing and unhealthy children. These are the births of stupidity which cannot be helped; so to be born of parents who have a sound mind in a sound body is far better than a large patrimony."

THE LAST ENEMY.

We have seen that Willis came into metropolitan life and practice in the year 1666-7, and that he attained great repute as a practitioner. It was not to be for long. Domestic sorrow befell him, and his was not the mind to bear trial with continued strength of body. His daughter Katherine died on September 30th, 1667, and his son Thomas falling ill with signs of pulmonary consumption, had to go to Montpellier, then the Mentone for England, for the restoration of his health. Then, alas! the good and loving wife next showed indications of pulmonary disease. For her sake he would have left London, but she would not permit so great a break in his work. She died on the Vigil of All Saints, 1670, and was buried in the North Cross, near the door entering the Choir, in Westminster Abbey. From that date his own health began to decline, but he remained at his labours until the middle of November, 1675, in which month, on the twenty-fifth day, he succumbed to pleurisy and peripneumonia, the effects of an epidemical catarrh then pre-

vailing, probably an influenza. From the Rev. Dr. John Fell, who was the brother of Mrs. Willis, we have a touching little narrative of Willis in his later days. Just before his death he had finished the second part of his *Pharmaceutice Rationalis*, and had written the preface. While this was printing, the sad message arrived that "the author most worthy of immortality, oppressed by the irresistible assaults of a pleurisy, departed from among 'the living.'" To the preface of the work, therefore, Dr. Fell added a fraternal postscript, in which is given a brief sketch of the early life of the anatomist and the final scene of his distinguished career. In this postscript is recorded the fact of a legacy which Willis left to St. Martin's Church,* and of the other generous gifts he made to the poor.

"From the beginning of his youth to the last period of his life," says Dr. Fell, "he (Willis) was master of no sum of money he accounted his own until he had consecrated some considerable portion of it to God and the poor; and when, a few days before his last, we conferred together, as if he had foreknown his approaching death and being more solicitous about the poor than his own offspring, he diligently advised about stating these accounts."

Undisturbed in adversity, temperate in prosperity, modest in his highest fame, prone to forgive injuries, candid and ingenuous in the profession of his art, indefatigable in his studies, and sparing in his speech, he commended in his last hour, Dr. Fell tells us, "his pious soul to God, having his senses entire to the last breath, and finishing his most exemplary life with the like death." He too was buried

* Touching this legacy I am deeply indebted to the present learned and most esteemed Vicar of St. Martin's, the Rev. J. F. Kitto, M.A., for the following reply to an inquiry I made of him on the subject:—

"ST. MARTIN'S VICARAGE, CHARING CROSS, W.C.,

"February 14th, 1892.

"MY DEAR SIR,—

"Dr. Willis's contribution, or rather legacy, was a rent-charge of £20 upon some property in Buckinghamshire, and is still paid. Formerly it was paid to the Master of Tenison's School for performing service daily in St. Martin's; now it is paid to the Vicar for providing daily service.

"I believe that the daily service has been held regularly ever since.

"Yours faithfully,

"J. F. KITTO.

"I think this was not his only benefaction to the parish, but I am not sure, and if there were others they are lost now."

in Westminster Abbey, near his wife, "morum suavitate insignis, summo omnium, ac imprimis marito."

A FINAL RECAST.

I bring to a close this imperfect notice of Thomas Willis with true regret, as if I were leaving a friend, beloved as well as honoured. What a faultless life! What a brilliant life! Yet since his death he has had his detractors. A Dutchman, one Schelhammer, in 1684, ventured to attack the work *De Anima Brutorum*, but the shaft fell harmless. Hutchinson in the *Biographica Medica* (1799) presumes also to be critical, arguing that although the works of Willis show the greatest ingenuity and learning, very little knowledge is to be drawn from them, and that perhaps no writings which are so admirably executed and proved such uncommon talents in the author were ever so soon laid aside as the works of Dr. Willis. So much for a commentator who did not understand the works, and who had not the penetration to recognise that they were laid aside simply because they were so much in advance of their day! There were few who had the industry to master them, or the intelligence to grasp the splendid and in many parts unmatched interpretation of nature which they unfold. In reality Willis ranks amongst the greatest decemvirate of physic, and is not second to any one of that immortal band. He was the true founder of a school of scientific medicine which, with many fluctuations, has lasted until the present time, a school whose prime aim it is to find out the causes of disease, and which considers it to be the highest skill, not only to find out causes, but to remove them altogether; a school also which looks on pathological as aberrations of physiological conditions, and which, in the art of prescribing for the sick, would like to learn the correct art from the correct scientific knowledge of the physiological action of every remedy that stands for cure.

Sir Kenelme Digby, F.R.S.

“**W**HEREAS, upon the mediation of her Majesty the Queen of France, it hath pleased both Houses of Parliament to permit me to go into that kingdom, in humble acknowledgment of their favour therein, and to observe and confirm a good opinion of my zeal and honest intentions to the honour and welfare of my country, I do here, upon the faith of a Christian and the word of a gentleman, protest and promise that I will neither directly nor indirectly negotiate, promote, consent unto, or conceal any practice or design prejudicial to the honour or safety of the Parliament. And, in witness of my reality herein, I have hereunto subscribed my name this third day of August, 1643.

“KENELME DIGBY.”

The “deed of honour” given in the above paragraph is characteristic in full of its author, of the time in which he lived, and of his social position and character at the moment when the document was sealed, signed, and delivered. He had been for some months confined in prison at Winchester House, by order of the Houses of Parliament, for having, at the instigation of the queen of Charles I., taken part with Sir Walter Montague and other Royalists in persuading the Roman Catholic community to raise a subscription army for the King in support of his defence against the troubles that were close upon him. The scheme, to a considerable extent, succeeded in so far as the contribution of money was concerned ; but it was very far from being a success politically and socially. The kingdom at the moment was Puritan in heart, and was, of all things resolute that neither Pope nor Cardinal should tithe or toll in its dominions ; and the army that was raised by the money of the papal adherents who were friends of the King got the name of the “Popish Army,” as bad a title as could be applied to it in the tone, then, of

the national mind. The Parliament, consequently, had seized Sir Kenelme as one of the promoters of the new device of a force that might be soon arrayed against itself and the liberties of the people, and in 1640 it subjected him to question as to the reason of his conduct and the extent of his action. From what ultimately transpired we may gather that the members of the Parliamentary committee who were concerned in the inquiry were struck by the candour of the man who was brought before them. He despised every kind of subterfuge or evasion. He told them clearly what it was he had done and why he had done it; and for a time he was left free. But when, somewhat later on, the civil war commenced in earnest, the courageous and in many ways powerful knight was laid hands upon and committed, as we have seen, to confinement. From this he was liberated, at the date named in his letter, on a request to the Parliament Houses from the Queen Dowager of France, communicated to them by the *Sieur de Gressy*, on the condition that the prisoner signed a declaration, such as he did sign, pledging his good faith that he would do nothing prejudicial to the honour and safety of the Parliament.

Readers who are not conversant with the life and character of a man in the position of an opponent to Parliamentary government in 1643, a knight raising forces for a king, and a friend, obviously, of a ruler in another country, will wonder how such a man can be brought into a history of medical scholars. Was he, Kenelme Digby, a physician or a surgeon? In the strictest sense he was neither, for he took no university or other title bearing, classically, on medical or surgical art. He was really a fighting man by land and by sea; he was a politician on the side of royalty; and he was independent of any professional ties, except in arms and politics. And yet, like many others, he is bound to our brotherhood by more than one act bearing on medical and surgical art. To the learning and diplomatic skill which were natural to him, and in which he excelled most markedly in the eyes of his cotemporaries, he added a love for natural philosophy, and made, thereupon, some additions to philosophical medicine which hold their influence even to the present day. It has been said of him, rather despitely, that he was "a leech," by which term knights who took part in the treatment and cure of the wounded in battle were often known. In old days, when the licence to kill or cure was not demanded by law, these leeches were free to practise, and were very free in suggesting lines of practice of the boldest type, in which labour they often rendered excellent service. Sir Kenelme Digby was an illustrious representative

of this order of generally useful men, pioneers of Science in her practical applications.

FROM CHILDHOOD TO MANHOOD.

The childhood of the man now before us is one of sad and painful romance. When he was three years of age, his father, Sir Everard Digby, suffered death on the gallows, and was, to use the common phrase, "hanged, drawn, and quartered," at the west end of Old St. Paul's in London. This tragical act was performed for his having taken part in the treason of Gunpowder Plot, a scheme for wholesale destruction of King, Lords, and Commons, that resembled closely the dynamite plots of the present day. Sir Everard had no actual part in the details of this miserable scheme, but, on his own admissions, during and after his trial, he entered into the idea of it at first, received the notorious Guy Fawkes at his house, and, for a time after his own seizure, persistently refused to give up the names of the other conspirators. At his trial he pleaded guilty, assigning for the reason of his guilt the argument that it was the duty of a true Catholic to attempt, at all risks and hazards, to restore the true faith to the English nation. When the judges had condemned him, he bowed to them, observing, "If I could hear any one of your lordships say you forgave me, I should go the more cheerfully to the gallows," to which they all replied, "God forgive you, and we do." Our old friend Wood, to whom all writers on biographical events occurring in or about his own time are so much indebted, reports respecting the death of Sir Everard that when the executioner plucked out the heart of his victim and, according to custom, cried to the people, "Here is the heart of a traitor," Sir Everard replied, "Thou liest."

The fate of the father was not reflected in any way on the son whose life is now before us. Little Kenelme was the eldest child of Sir Everard, and had one brother, John, who, like himself, afterwards rose to great fame. The boys at the time of their father's death were with their mother, Mary Digby, *née* Mary Mulsho, at Gothurst, in Buckinghamshire, where the family lived on an estate which had descended to Lady Digby from her father, William Mulsho. The birthday of Kenelme was June 11th, 1603. His mother was not for long allowed to retain him by her side, for she too was suspected to be of "Popish belief," and the child must needs be taken from her, made to accept the new or Protestant creed, and placed under the tuition and care of Laud, then Dean of Gloucester, afterwards doomed

to die on the scaffold as the renowned Archbishop and assumed traitor to the Commonwealth. The family estate remained to the boy, who, under the care of Laud, became rapidly a scholar of first promise. He grew up in health and of robust form; and in his fifteenth year was entered as a gentleman commoner at Gloucester Hall, Oxford. He remained in college, the admiration of his tutor and fellow-students, nearly three years, and then setting forth on his travels abroad, made the famous round of France, Spain, and Italy, became "Italianated" as the saying went, and returned home accomplished in all the arts and sciences of his time. It was in this journey that he learned what has been considered the grand secret that connects his name with medicine; and, soon after his return, whilst staying at Lord Montague's house at Hinchinbrooke, he was introduced to the King, James I., who, forgetting his father's delinquencies or, more correctly speaking, overlooking them, and admiring the abilities of the son, conferred on Kenelme the order of knighthood in the year 1623.

King James died in 1625, and Charles I., on his accession, took the young knight into favour so warmly that Sir Kenelme Digby soon became quite a favourite at the Court. He was appointed a gentleman of the bedchamber, a commissioner of the navy, and one of the governors of Trinity. His work as a naval commissioner, moreover, was not merely honorary; it became practical. He was made a general or admiral of a small fleet which was sent out in 1628 to chastise the Venetians in the Mediterranean. He reached Algiers in the summer of that year, rescued a large number of English slaves, and finding the Venetian fleet in the Bay of Scanderoon, attacked it there with success, and returned home a renowned man.

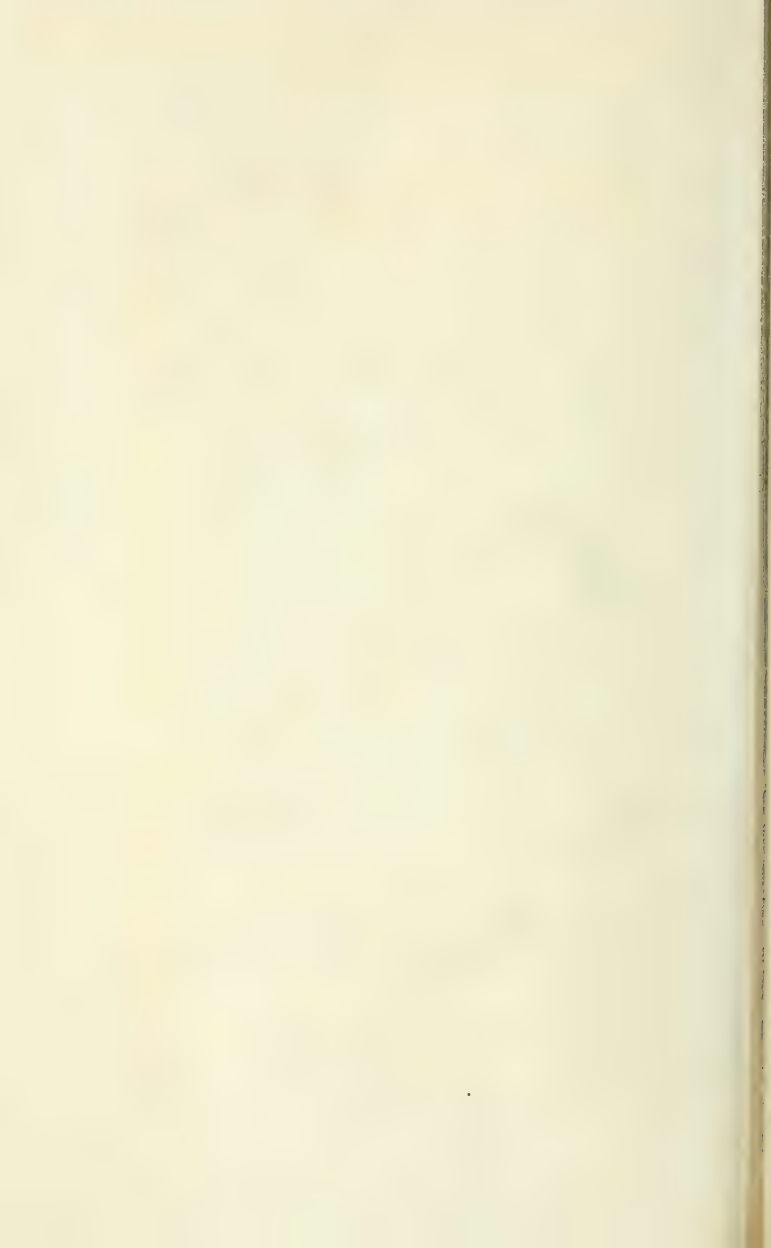
SCHOLAR AND PHILOSOPHER.

Up to this period of his career Sir Kenelme Digby was generally recognised by his connection with public affairs, apart from any kind of philosophical learning or aptitude, but now he entered the ranks of the men of science and philosophy. His admiring tutor at Oxford, Thomas Allen, of Gloucester Hall, who, struck by the breadth of his knowledge, compared him to the famous Pico Mirandola, died in 1632 and left him a collection of literary works, in manuscript and in print, which were considered to be of great value. The bequest was a treasure so esteemed by the students of the university that, regret having been expressed at the loss of the collection by the university,



Kenelm Digby

From an engraving by Honbraken, 1748, after a painting by Vandyck in
Kensington Palace.



Sir Kenelme in 1633 quieted the alarm by generously giving every work to the Bodleian Library. There were two hundred and seventy-seven manuscripts, of which thirty-six were in Hebrew and Arabic. They were sent by him to the Dean of Gloucester, Laud, to be forwarded by the Dean with some of his own. In this way they passed in the Bodleian under Laud's name until a few years ago, when the learned and able librarian, Mr. E. W. B. Nicholson, discovered the actual facts and referenced the works as "MSS. Digby Oriental," for which he deserves the best thanks of all scholars interested in the biography of the remarkable donor of so rich a gift to the great university library.

Not long after these events in the course of his life, a change came over the mind of this hitherto fortunate man. He had been brought up as a Protestant, and had adhered to the new system both as student and commander. Probably he had not hitherto paid close attention to the question of religious faith or belief; and almost certainly he had, so far, lent himself to the influence of Laud, whose powers of persuasion were of the most effective nature. Now, however, Sir Kenelme began to have doubts in favour of the Church of his fathers, doubts not surprising when the hereditary tendencies of his family are remembered. He returned to Paris probably in the year 1634, and whilst there he reviewed the history of the separation of the Protestant community from the Church of Rome. The result of his inquiry was to lead him back to the faith in which he was begotten, and which in the earliest days of his life had doubtless been instilled into his mind. The fact of this change in his life he first communicated to Laud, who reasoned with him without, say the biographers, having much hope that his arguments would take effect. Subsequently, in 1636, he published a treatise entitled *A Conference with a Lady about the Choice of a Religion*, in which, like some later converts to the ancient Church, he vindicated his action with moderation and brevity. He afterwards entered into a correspondence on the same subject with his cousin, Lord George Digby, showing in his letters, which have been retained and published, the same moderation as characterised his previous treatise.

A letter referring to this controversy, which bears date from London, shows that Sir Kenelme had returned from France to his native country in December, 1638. His return was, we may fairly assume, for the political purpose noticed in the opening page of this article. He had in view the attempt to raise a papal army for the King, at the instigation of the most confirmed woman-plotter that

ever lived—the Queen Henrietta. The attempt, as we have seen, failed, and the chief partner in it, seized when the real troubles were beginning, was placed as prisoner in Winchester House, whence he was released on signing the declaration that he would take no part in infringing the liberties of the Parliament.

It was natural, after signing so important a document—a document which did in fact admit a certain measure of complicity in a design for royal, as distinguished from popular, power—that Sir Kenelme Digby should once more seek the protection of France. He left for the French capital in the latter part of 1643 or early in 1644 ; but it is worthy of note that before he left he was brought before a committee of the House of Commons to give evidence bearing on the conduct of his old friend and master, Archbishop Laud. Laud had been suspected of an intrigue with the Court of Rome. It was largely believed that his wishes tended towards Rome. The common belief or suspicion, a belief or suspicion that is not, in relation to his history, extinguished altogether even at the present hour, was that the Archbishop was negotiating for a cardinal's hat, on the condition of his conversion and the restoration of the Romish Church in these islands. Digby, it was assumed, must be conversant with any design of the kind if it existed, and for this reason the Commons, who had recently released him from prison, called him up for examination on the question. The answer obtained was all in favour of the prelate ; it was to the effect that the witness knew nothing whatever of the suspected intrigue, and that he believed the Archbishop to be a sound Protestant. The fact that the answers given were accepted in good faith, although they came from one who had recanted, and who had actually been a prisoner of the Parliament, affords perfect evidence of the confidence felt in the honour and integrity of the man who gave them.

The residence of Sir Kenelme Digby in France, recommencing in the year 1644, extended until the triumph of the English Parliament over the King was complete. During this exile he became the friend of the illustrious René Des Cartes, with whom he held frequent converse on various subjects in the realm of philosophy. For his first interview with Des Cartes Digby went to Holland, whither, at Egmond, the great philosopher had retired. The account of the meeting of these two remarkable men has been retained by Desmaizeaux, and is curious as affording a picture of compliment between two courtiers of philosophical type. It is told that Des Cartes did not at once reveal himself to his visitor,

but conversed with him first on some subject of philosophy bearing on points upon which Digby had written. Then he added, "I do not doubt you are the famous Sir Kenelme Digby," to which the "famous" responded, "And if you, sir, were not the illustrious M. Des Cartes, I should not have come here for the purpose of seeing you."

There was so much in common between Sir Kenelme Digby and M. René Des Cartes, it affords little cause for surprise they remained friends. They were both inclined to physical research, and they were also both inclined to metaphysical studies. This is but saying that they were imbued with a poetic as well as a scientific spirit, and under the dual influence tried to reach the unattainable through the attainable. The career of Des Cartes is singular in the matter here named: he began as a most zealous student of the most exact of the sciences, geometry, accounting for nothing except by absolute demonstrative argument. He ended, I believe, by an argument on the rule that two and two make four because "God willed it so." The argument would have suited Sir Kenelme Digby to the letter; he too began with the study of the exact in knowledge, but early in his career passed over to the mystical, and, without letting the mystical master the practical, explained or tried to explain the practical through the mystical—a hopeless task, and yet in some minds even in this day as strong and as inevitable as the dual nature of man himself. It is belief in contest with knowledge, with wisdom as a mere spectator.

SIR KENELME AS A PHILOSOPHER IN THINGS MEDICAL.

It is time now to refer to Sir Kenelme Digby as an author, and to glance at the philosophy which appears in his works, and especially in that part of them which bears on the philosophy and practice of medicine. I have said that he was not directly connected with the practice of medical or of surgical art. He probably never wrote a medical prescription, as Harvey or Willis did; probably he never performed a surgical operation, as Wiseman did; but for all that he was looked upon as learned in physic. The impression conveyed to me about him by one of my own early teachers was that he was a kind of learned charlatan, an observant scholar who dabbled in medicine, and who, in an accidental manner, alighted upon one or two curious facts which the profession of medicine turned to account. We gather somewhat of the same tone

from the writings of Dr. Paris. In the *Pharmacologia* Paris deals with Digby, not at great length, but with considerable mastery and with an offhand admiration. The feeling is natural. Men of physic, like men of all other professions, dislike, above all things, to acknowledge outsiders, whatever may be their skill, as within the pale, as men of other callings are equally determined not to acknowledge men of physic in their pale. Smollett was a man of letters, but to hold that position he had to give up the practice of medicine; and even then the "M.D." attached to his name injured his literary fame. Goldsmith had to be sacrificed as a medical doctor before he could be accepted as poet, playwright, story-writer, and historian. If Keats had recovered from the illness that brought his life to a close and had continued in our ranks, according to his own intentions, John Keats, surgeon and accoucheur, he would never have been "a joy for ever" as John Keats, poet and author of one of the most familiar lines in all poetry; his name would then, indeed, have been "writ in water." And so, turning the argument round, no man, whatever his qualifications, can hold his place in the history of physic unless he belongs to it actually and in a certain sense depends upon it as a profession; Sir Kenelme Digby has, therefore, never been considered, and is never considered by us, as in our camp in the strict sense of the word.

The only common ground for outside medical scholars and inside medical scholars lies in what is called philosophy. Philosophy covers everything in learning, and a man may be a philosopher on things medical and yet not be a medical philosopher. It is a fine distinction, but it has always, and always will, probably, exist. Celsus stands before us in this light, and many more that might be named. Here, too, I should place Sir Kenelme Digby: he was a philosopher in matters medical; his tastes ran with medicine; he studied some medical subjects, not with a trained or mechanical eye, as one to the manner bred, but with a natural and earnest inquisitiveness, which brought forth useful knowledge tinged with mysticism, ridiculous, perhaps, in theory, yet still useful in practice, and in the end explanatory in its scientific development. To do him proper justice, Sir Kenelme Digby was in matters medical a mystic as distinguished from a charlatan; there is not a shadow of evidence that he ever traded on his medical acquirements; he might have done so and have made a great fortune, but he did not, for which all honour to his reputation! Moreover,

he was as loyal a scholar to physic as any scholar of his date could be. He read our best authors; he was loud in his admiration of William Harvey, whom he knew personally; it is certain that he was in possession of the best medical labours of his time, and he distinguished ably between the good and the bad. Let us accept him, with this knowledge of him, and taking him as he was, see something of what he taught bearing on our science and our art.

ON THE NATURE OF BODIES.

I notice, in the first place, a treatise by Sir Kenelme on *The Nature of Bodies*, in which he deals with "quantity, rarity, density, elements, light and what it is, local motion, gravity and levity, reflection, modulation, refraction, compositive qualities and generation of mixed bodies, rarefaction, condensation, attraction, filtration, restitution, electrical attraction, loadstone attraction; plants and animals, and how they are formed in common to perform vital motion; the generation of animals; figures of plants and animals; beginning of motion in living bodies, the motion of the heart, the circulation of the blood; nutrition, augmentation, and corruption or death; the motions of sense, touch, taste, smelling, hearing, sight, and colours; sensation, memory, voluntary motion; the passions; the material instruments of knowledge and passion; pain and pleasure; the reasoning of beasts, and the docility of some irrational animals."

Of Plants and Animals and Vital Motion.

A curious description of magnetic phenomena, in which the labours of William Gilbert—who is classed with William Harvey as one of the two great lights in the philosophy of the age they adorned—lead to a chapter on the two sorts of living creatures, plants and animals, and how they are formed in common to perform vital motion. Plants in his view are one continuous substance, wherein we observe one and the same line of progress throughout, from the highest to the lowest part, so that the operation of one part is not at all different from that of another; but the whole body seems to be the course and thoroughfare of one constant action, varying itself on divers occasions and occurrences according to the disposition of the subject. Animals differ from this in that their parts are notably separated the one from the other, and each of them has such a peculiar motion,

proper unto it, that one might conceive they were every one of them a complete distinct total thing by itself, and that all of them were artificially tied together, were it not that the subordination of these parts to one another is so great, and the correspondence between them so strict, "as plainly convinces that the compound of all these parts must needs be one individual thing."

He illustrates his meaning in this matter by reporting on two machines he saw at work—one in Toledo, the other in Segovia—when he was travelling in Spain. The engines were moved by water, and one of them performed one kind of work alone; the other, "a multitude of engines," flattened into a plate an ingot of silver, delivered the plate it had made to another section, that printed it as a coin and passed it over to a third that cut it to a proper weight and shape, and so on. Both engines derived their power from the same source, like plants and animals; but one was like a plant, the other like an animal.

Some exceedingly curious passages occur in this work of Sir Kenelme respecting the cause of the motion of the heart. Here he shows his admiration of Harvey, and pits him against his friend Des Cartes. Des Cartes had a curious notion. He fancied that the blood is forced out of the cavity of the heart all over the arterial circuits by pressure of steam generated from the blood within the ventricles. To this Digby replied that the heart has a power of motion in itself, that could be witnessed in such a reptile as the viper long after death and when all blood is removed from it; and although he did not understand the heart as a muscle, he clearly saw that it acts after the manner of a muscle, and that it obeys the law of contracting when it is full of blood, by virtue of its own contractile power and independently of any force generated in it by the blood. At the same time he detected that the power of the heart is fed by blood, and he was, I believe, the first to assert that the organ is made up of different sets of fibres: one set "the straight ones, which go long-ways on the sides of the ventricles from the thick basis of the heart towards the little tip or cone of it; the second round-ways about the ventricles within the heart; and the third transversely." These different arrangements of fibres give, he thought, an independent motion to the systole and diastole, and he ventured, correctly, to disagree with Harvey himself on the diastole, which is not, he thought, a mere "relenting from motion," according to Harveian doctrine, "but is a complete motion, and in a manner greater than the systolic contraction, though less sensible."

On Death and Sickness.

There are many more remarkable passages in this work which I should like to present. I must be content with one or two. In a chapter entitled *On Death and Sickness*, I would have him properly heard. I give therefore a passage entire:—

“In the essential composition of living creatures there may, peradventure, be a physical possibility for them to continue always without decay, and so become immortal, even in their bodies, if all hurtful accidents coming from without might be prevented. For, seeing that a man, besides the increase which he maketh of himself, can also impart unto his children a virtue by which they are able to do the like and to give again unto theirs as much as they received from their father, it is clear that what maketh him die is no more the want of any radical power in him to increase or nourish himself, than in fire it is the want of power to burn which maketh it go out. But it must be some accidental want, which Galen attributeth chiefly to the dryness of our bones and sinews, etc., for dryness with density alloweth not easy admittance of moisture; and therefore it causeth the heat which is in the dry body either to evaporate, or to be extinguished; and want of heat is that from whence the failing of life proceedeth.”

Teaching the Dumb to Speak.

A chapter on the senses and their mode of action is rich in suggestion and often advanced in knowledge. Digby knew perfectly well that the senses of taste and odour were due to the impressions of fine particles; he knew that the sense of hearing was due to waves of air, and he experimented on himself by lying under water in order to learn how far waves of air above the water would cause waves in the water, which, being communicated to his tympanum, would produce sound; he had an excellent appreciation of optical laws and of the sense of sight; but the most important and curious portion of his work here lies in the pages where he shows “how one sense may supply the want of another.”

There is truly nothing new under the sun. We have prided ourselves that in our day we have learned the art of teaching the dumb to speak. We call this beautiful art “lip-reading”; Sir Kenelme Digby called it “hearing by the eyes.” A Spanish nobleman, brother of the Constable of Castile, was born deaf, so deaf that if a gun were shot off close to his ear he could not hear it, and “consequently he was dumb, for, not being able to hear the sound of words, he could

never imitate nor understand them." Many attempts were made in vain to remedy the defect. At last a priest undertook the teaching of him to understand others when they spoke, and to speak himself that others might understand him; "and what at first he (the priest) was laughed at for made him after some years be looked upon as if he had wrought a miracle. In a word, after strong patience he had brought the young lord to speak as distinctly as any man whosoever, and to understand so perfectly what others said that he would not lose a word in a whole day's conversation."

The priest, who wrote a book on this subject, was alive when Digby was in Spain with the Prince of Wales (afterwards Charles I.), and both the Prince and he saw the brother of the Constable who had been taught to speak. The Prince, who had, as we know from the life and work of William Harvey, a great liking for natural science, was as intensely interested in this so-called miracle as Digby himself. They observed about the voice of the deaf-mute that, "not hearing the sound he made when he spoke, he could not steadily govern the pitch of his voice, but it would be sometimes higher, sometimes lower, though, for the most part, what he delivered together he ended in the same key as he began." He could discern in another whether he spoke shrill or low, and he would repeat any hard word after anybody, which the Prince tried often, not only in English, but by making some Welshmen, who served his Highness, speak words of their language, which he so perfectly echoed that "his master himself would acknowledge that the rules of his art reached not to produce that effect with any certainty, and therefore concluded this in him must spring from other rules he had framed unto himself out of his own attentive observation." The last fact most astounded Sir Kenelme, because, he says, "the Welsh tongue, like the Hebrew, employs guttural letters, and the motion of that part which frames them cannot be seen by the eye otherwise than by the effect they may haply make by consent in other parts of the mouth." Yet this young nobleman read by the motions he observed alone; he could say words after a speaker at a distance when Digby, standing by his side, could not hear them. "But if he were in the dark, or if one turned his face out of sight, he was capable of understanding nothing one said."

CURE BY SYMPATHY.

The work that has made Sir Kenelme Digby best known to the medical world is his *Discovery upon the Cure by Sympathy*. This

discovery, so called, was made during his residence in France about 1622-3. On his return he explained the secret of his "cure" to the King, James I., to the Prince of Wales, the Duke of Buckingham, and other well-known persons, and, as it would appear, he brought the "discovery" into practice and gained by the success of it much repute. He did not claim for the secret any original work of his own, but said he had obtained it from a Carmelite friar, who himself had learned it either in America or Persia—rather a wide distinction.

The nature of the sympathetic cure was simple enough: it was a combination of what may be called faith-healing with a process of rest and natural healing. There was called into practice the aid of "a sympathetic powder," composed of green vitriol, calcined and finely pulverised. This powder was not applied to the body of the wounded person, but to the weapon which had inflicted the wound. The weapon was covered with lard, the sympathetic powder was applied, and then the weapon, the dressing of it complete, was covered up; but the process was sometimes repeated as many as three times a day, the patient knowing all through what was being done for him in this manner. As to the wound, that, brought together neatly with clean linen bandages or strips, and covered, according to the prevailing custom, with the admirable friar's balsam, was left to take its rest, without *being disturbed or touched for seven days*, at the end of which time, on the bandages being removed, the wound was usually found entirely and soundly healed.

The practice of the sympathetic cure was considered in its day a marvel. It was translated into English in the year 1658, and it filled its place in the minds of men. As a matter of course, the poets gave a taste of it, for it suited their work of combining the faculty of imagination with the field of fact. In the *Enchanted Island* Dryden makes Ariel give as a direction for treating a wound—

"Anoint the sword which pierced him with this
Weapon salve, and wrap it close from air,
Till I have time to visit it again."

And in another passage he makes believe that the wounded were conscious of the dressing of the weapon; that pain in the wound occurred when the sword was unwrapped, and relief when it was re-dressed and covered from the cold air.

Dr. Paris, in his *Pharmacologia*, to which reference has been already made, comments with his usual skill on this process of healing by perfect rest through the first intention. He reasoned

most properly that "the triumph of the cure was decreed to the mysterious agency of the sympathetic powder which had been so assiduously applied to the weapon, whereas it is hardly necessary to observe that the promptness of the cure depended upon the total exclusion of air from the wound, and upon the sanative operations of nature not having received any disturbance from the officious interference of art : the result, beyond doubt, furnished the first hint, which led surgeons to the improved practice of healing wounds by what is technically called the *first intention*."

The general truth expressed in the above sentence stands now firmly acknowledged. There is no doubt that wise men soon began to see the true influence that was at work towards cure. In Spain to this day the treatment of wounds by quick closure and avoidance of water has remained the favourite practice ; and in France in the last century the distinguished Belloste, in his treatise on the cure of wounds by the exclusion of air from them, established a principle in surgical art that found its way into our own country, and became a procedure which, departed from for a time in some quarters, has lately been revived, as if it were a new discovery. We must not, however, entirely disregard the influence which Sir Kenelme Digby denominated as "sympathy." In his day what we call superstition had a much stronger hold on the mind than it has now, and he himself is criticised for that he gave as a cure for warts, "Wash your hands in an empty basin into which the moon shines." Wherever such sentiments prevail faith is strong. There was some faith, therefore, in the sympathetic cure, and that may have added to the good effect. The treatment of the sword or weapon with the sympathetic powder kept the patient from thinking of the wound, and, above all, from meddling with it. It was cure by diversion of mind, not sympathy, and diversion of mind is truly magical in its influence, as we all know when we recognise the good effect of change of scene and change of occupation during a holiday season. It may be inferred that Sir Kenelme Digby, a man given to the mysterious, was all mystery. Not at all ! He was as practical as he was mystical—a fact which will be shown in the next few paragraphs.

THE CLOSET FOR COOKERY.

Amongst his other learned studies, Sir Kenelme had a taste for cookery, and in 1669, by his son's consent, a posthumous work of his was published by H. Brome, at the Star in Little Britain, entitled,

The Closet of the Eminently Learned Sir Kenelme Digbie, Kt., Opened, whereby is discovered Several Ways of Making Metheglin, Sider, Cherry Wine, etc., together with Excellent Directions for Cookery, as also for Preserving, Conseruing, Candyng, etc.

No name is given of the collator of these writings, but, whoever it was, he was very delighted with his task and proud of his author. "The like," he says, "has not in every particular appeared in the English tongue." Metheglin, mead, or meath, seems to have been a favourite drink with Sir Kenelme. He gives for it recipes numerous, and sings his praises over them all. It was a drink made with honey and treated with hops, various herbs, ginger, cloves, and other substances, according to the flavour required. White mead was much commended, and to one specimen there was given the name "liquor of life." After recipes for meat there are some for country wines and for possets, followed by others for potages, in which are several useful forms. Amongst these potages is one called "Portugal broth, as it was made for the Queen," and appended to this is given the "Queen's ordinary *bouillon de santé*," a dish of which she partook in the morning. It is worth copying in full, as an indication of a royal breakfast meal in the seventeenth century:—

"A hen, a handful of parsley, a sprig of thyme, three of spearmint, a little balm, half a great onion, a little pepper and salt, and a clove, as much water as would cover the hen, and this boiled to less than a pint for one good porringerful."

"Tea with eggs" was a favourite meal in an emergency. "The Jesuite that came from China ann. 1664 told Mr. Waller that they use tea sometimes in this manner: 'To near a pint of the infusion of tea take two yolks of new-laid eggs and beat them well with fine sugar; pour your tea upon the eggs and sugar, and stir them well together. So drink it hot.' 'This when you come home from attending business abroad, and are very hungry and yet have not conveniency to eat, is a competent meal. This presently discusseth and satisfieth all rawness and indigence of the stomach, flyeth suddenly over the whole body and into the veins, and strengtheneth exceedingly, and preserves one a good while from necessity of eating.' It is a fault to let the hot water remain too long on the tea: 'The hot water is to remain no longer than whiles you can say the Miserere Psalm leisurely. Then pour it upon the sugar and eggs. Thus you have only the spiritual parts of the tea, which is much more active, penetrative, and friendly to nature.'

One dram of tea will serve for a pint of water." To all of which I say, Good Sir Kenelme, you were an advanced tea-maker !

Pap of Oatmeal.

Here is another excellent form of food, which I have tried and found as pleasant as it is sustaining. He calls it oatmeal pap or pottage :—

"Beat out oatmeal small ; put a little of it to milk, and let it boil stewingly till you see that the milk begins to thicken with it. Then strain the milk from the oatmeal and boil the milk to the height of pap, which sweeten with a little sugar, and put to it some yolks of eggs dissolved in rose or orange-flower water, and let it mittoner a while upon the chafing dish. Add a little butter if you like it. You may boil a little mace in the milk."

Gruel of Oatmeal and Rice.

"Doctor Pridion ordered my Lord Cornwallis for his chief diet in his looseness the following grewel : Take two parts of oatmeal and one part of rice in fine powder. Boil these well in water, as you make water grewel, adding a good proportion of cinnamon, to boil also in due time. Then strain through a cloth and sweeten to taste."

Clear Jelly of Bran.

"Take two pounds of bran of best wheat, and put it to infuse in a gallon of water during two or three days. Then boil it three or four hours, and presently take it from the fire and strain it through a fine strainer. Pour off the clear water, and boil it up to a jelly, and season to taste."

Buttered Whiting and Eggs.

"Boil whittings with butter sauce. Pick them clean from skin and bones, and mingle them well with the butter ; season with salt. Butter some eggs in the best manner, and mingle them with the buttered whittings, and mash them well together. The eggs must not be so many by a good deal as the fish."

The food preparations are all so excellent, and the book from

which they are copied is now so rare, I have thought it useful to give the recipes in full. Each one is of service in the treatment of the sick, and if there were space at my command I should add many more of equal, if not of superior, service. They show, all through, the practical bent of mind of their author, and throw a light on the foods of our forefathers which does them credit for far more skill than we are accustomed to give them. The foods, however, are chiefly after the French fashion, and show our Gallic neighbours as even two centuries ago far beyond us in culinary art. The queen to whom Sir Kenelme refers was not the queen of England, but the dowager queen and regent of France, by whom he was held in such high estimation.

EPITAPHAL.

There are many more works of Sir Kenelme Digby that might be set before the reader, but as they bear on theology and other topics not medical in their nature, I must pass them by in order to bring briefly the incidents of the life of this remarkable man to a close. Until the end of the reign of Charles I. he remained in France, but on the declaration of the Commonwealth in 1649 he returned to England for the purpose of looking after his estates. He was bluntly treated by the new Parliament, which liked him not, and commanded him to leave England at once, with the understanding that if he returned again without permission his life as well as his estates would be forfeited. Thereupon he went back to France, was attached to the dowager Queen Henrietta as her Chancellor, and remained away until the Lord Protector Cromwell attained supreme power in 1653. In these four years the good character of Digby, according to some biographers, was not maintained. The Queen sent him on a mission to Pope Innocent X., to whom he "behaved," according to Wood, "so haughtily that the Pontiff took offence." He was also accused at this time of manipulating for his own purposes some of the funds that had been raised on behalf of the poor and distressed Catholics in England. How far this was true it is hard to say, for, as Chancellor to one of the most unscrupulous women that ever lived, it may easily be supposed that no personal profit of his own caused him to apply political funds to purposes for which they were not intended. It is likewise clear that Charles II. passed over his offence, since he nominated him on the first Council of the Royal Society in 1663 as "Chancellor to our dear mother Queen Mary."

It is further worthy of note that the Jesuits, ever his foes, never scrupled to make the worst of him.

But now appears a singular passage. After Cromwell was supreme master, Digby not merely returned once again to England, but became actually a friend of the Lord Protector, who allowed him perfect freedom at home, and permission to strive to obtain freedom for all members of the Church of Rome under the rule of the Protectorate. He passed as he liked to France, resided amongst and discussed philosophy with the learned men of Toulouse, and sent over from there an account of a petrified city in Tripoli, which, published in our own *Mercurius Politicus*, caused Henry Stubbes to speak of him as "the Pliny of the age for lying." He moved to Montpellier, then a famous seat of learning; read to the Academy of Sciences there his *Discourse on the Cure of Wounds by the Powder of Sympathy*; travelled in Germany; made his way back to Paris in 1660; and after the restoration of the monarchy here took an active part in the foundation of the Royal Society, to which he communicated a paper on the *Vegetation of Plants*, and in the affairs of which he continued to be active so long as his health permitted.

Still young in spirit, though getting old in years, Digby settled down for good at a house he possessed in Covent Garden, London. He had been married some years before to Venetia Stanley, daughter of Sir Edward Stanley, of Tongue Castle, in Shropshire, and by her he had two sons: one, Kenelme, who was slain fighting for the King at the battle of St. Neots, on July 7th, 1648; and another, John, who survived him and succeeded to the family estates.

In the Covent Garden home the brilliant and handsome philosopher—for, whatever his faults, he was both brilliant and handsome—ended his days. His house became the centre of the learned men of the time, and his library, which had been collected chiefly in France, fell to the Crown on his decease.

The cause of his decease was stone in the bladder. He died from it on June 11th, 1665, and was buried in a vault in which the body of his wife had lain for some years in Christchurch-within-Newgate. The monument over the vault, and copper-gilt bust of Lady Digby, was destroyed by the Great Fire of London. The true character of Sir Kenelme Digby has not up to the present time been fairly appreciated on either side. Wood, who does not endeavour to hide his faults, is nevertheless warm in his admiration. He speaks of him as a "person handsome and gigantic, in whom nothing was wanting to make him a complete Cavalier. He had," continues the same

author, "so graceful an elocution and noble address that, had he been dropped out of the clouds into any part of the world, he would have made himself respected ; but the Jesuits, who cared not for him, spoke spitefully and said it was not true. He had a great faculty, which proceeded from abundancy of wit and invention, of proposing and reporting matters to the *virtuosi*, especially to the philosophical assembly at Montpellier and to the Royal Society at home." This from a rather blunt and severe critic was considerably to the credit of the scholar, and was surpassed by R. Farrar, who wrote the following epitaph :—

"Under this tomb the matchless DIGBY lies,
DIGBY the great, the valiant, and the wise,
This age's wonder for his noble parts,
Skilled in six tongues and learned in all the arts,
Born on the day he died, the 11th of June,
And that day bravely fought at Scanderoon ;
It's rare that one and the same day should be
His day of birth, of death, of victory."

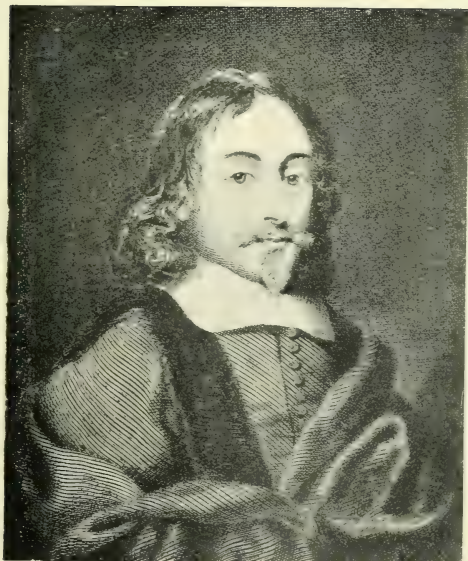
Let us, however, neither be led away by Wood nor Farrar ; let us take Sir Kenelme Digby as we find him in his works, and on the pure principle, " nothing extenuate nor aught set down in malice," accept him as he was, a man who rose in spite of the evil star under which he was born, became useful, and died in good-will with good men.

Sir Thomas Browne, M.D., and the *Religio Medici*

AFTER writing the life of Sir Kenelme Digby, I discovered a somewhat important omission. I failed there to state that whilst Sir Kenelme was confined in Winchester House he received a letter from Edward, Earl of Dorset, recommending him to read a book which was at the time (1642) the talk of the town—namely, the *Religio Medici* of Sir Thomas Browne. The famous work had not at that time been published authoritatively, but Digby, after a hasty perusal of a copy of it—for which he sent a special messenger to St. Paul's Churchyard, where the publisher, Andrew Crooke, resided—wrote offhand a criticism or review of it, completing his notice within twenty-four hours, to the apparent annoyance of its author, who pleaded that the review should not be published until the work itself was complete.

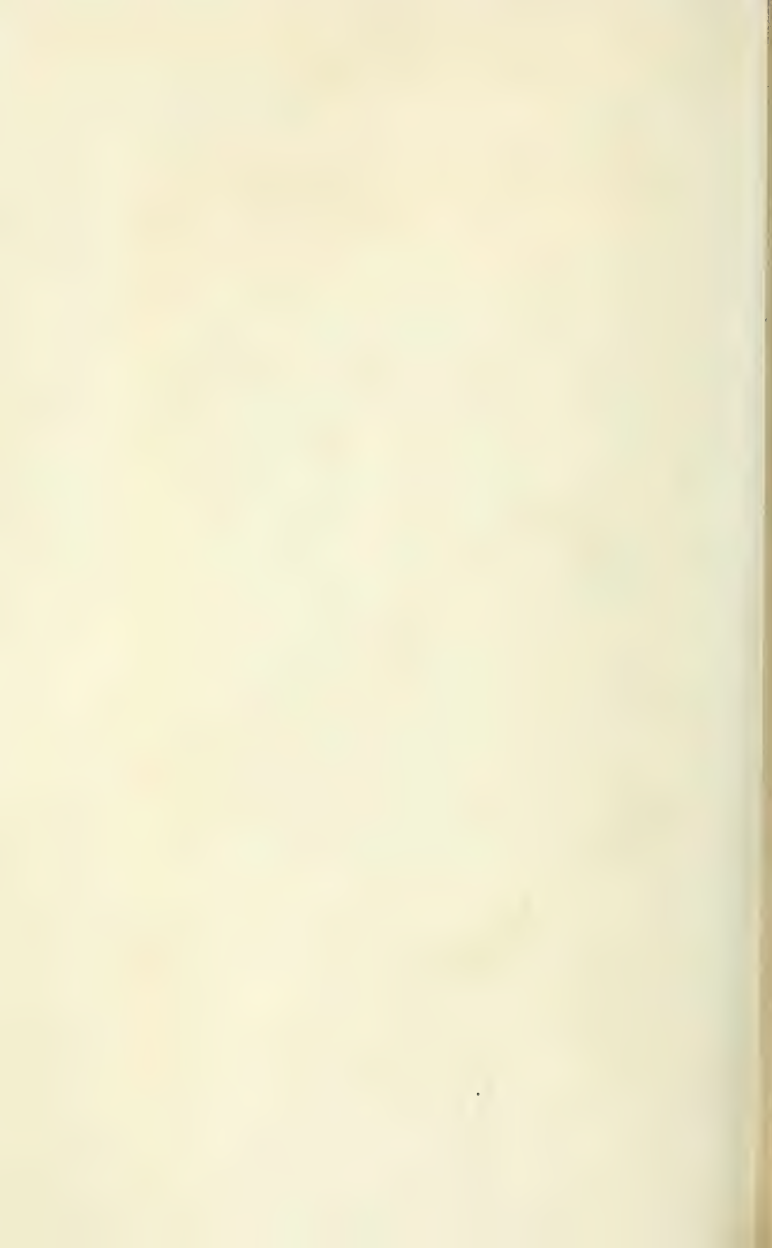
I was annoyed at first at this omission, but have appeased my mind by selecting the author of the *Religio Medici* himself for this memoir. The one life naturally leads up to the other, and affords grounds of contrast which it may be instructive to rest upon. Both men, Digby and Browne, are remarkable characters, and have more than once been held up together, with the questioning of Hamlet, "Look thou on that picture and on this," as if the picture of Kenelme Digby paled before that of his gifted cotemporary; as if Digby were a pretender, Browne a philosopher; as if Digby were a casual and loose observer, Browne a philosophical investigator; as if Digby had a mere show of mental quality, Browne true genius; as if Digby were an actor inspired by popular adulation and approved only by the vulgar, and Browne were the man inspired by nature.

When in the year 1864 I was in Norwich, engaged in writing for the *Medical Times and Gazette* the medical history of that famous



Tho. Browne

From an engraving, for Wilkin, 1836, by Edwards, from White's engraving in first folio edition of "Browne's Collected Works," 1686, and from original picture at Oxford.



city, I was shown in the museum connected with the hospital there what purports to be the skull of Sir Thomas Browne. The skull was in an excellent state of preservation, and I then reported on it that, although it was rather above the ordinary size, it was not altogether Jovian. The forehead is very retreating, and the animal part, if the phrenologists are right, is rather too much developed for so good a man. I added that independently of the balance of power theory, a theory as useful to the disciples of Gall as to those of Machiavel, the skull conveyed to the mind the idea that its owner "was a perceptive rather than a reflective man," a view which was sustained by the readings of the skull made by the learned antiquarian Fitch, who unearthed it, with the other parts of the skeleton of Browne, from the chancel of the church of St. Peter's, Mancroft, Norwich, in the year 1847. In addition to these notes on the skull of Sir Thomas Browne, I offered a few observations on his life and life's work after a study of his *magnum opus*, the *Religio Medici*, and drew from that study, and from that of his other works, the inference "that the true character of Sir Thomas Browne has yet to be written."

Since that time, twenty-eight years ago, much has been published respecting this remarkable figure in medicine. * Dr. Greenhill's splendid edition of the *Religio Medici* has appeared adorned with the beauty of faithfulness and fidelity that distinguishes every page falling from the pen of our greatest living scholar and critic; and, quite recently, two new editions of the work have appeared in cheap form, with short details of the life of their author, for popular reading. The time, therefore, is in joint for the review in this place of a chapter in medical biography that has a true national history connected with it as well as a philosophic. In this review I shall treat on the works rather than the man, but, according to custom, I shall venture first to present, in simple outline, the man to my readers as he was known and appreciated in his day and generation.

BIOGRAPHICAL EXTRACT.

It is probable that no physician has received so much attention from eminent biographers as Sir Thomas Browne. Something about him of fascination has led to his fame as a classic, and it is as a classic rather than as a physician he lives. He wrote a brief autobiography for Anthony Wood. A volume of *Minutes* relating to him

* Dr. W. A. Greenhill, M.D., the eminent medical scholar, died September 19th, 1894.

was written soon after his death, at the request of his widow, by the Rev. John Whitefoot, with some additional information communicated to Bishop Kennet by his daughter, Mrs. Lyttleton. A distinct Life was published in 1712, with his posthumous works. In 1736 another Life appeared in combination with a new edition of the *Religio Medici*, and in 1756 the great Samuel Johnson wrote a most interesting memoir for the second edition of another work of Browne, entitled *Christian Morals*. In the *Biographia* an article came from the pen of Dr. Kippis. Other short and incidental memoirs followed these, but nothing considerable until Simon Wilkin, F.L.S., edited the complete works of the author in 1836, in what is known as the Pickering edition, published by William Pickering, one of the most enterprising and excellent publishers that ever adorned the trade. Quite recently Dr. Lloyd Roberts, of Manchester, has written for the "Stott series" a faithful and condensed Life as a prelude to the principal works of Browne. With these a most useful chronological table by Dr. Greenhill, in his splendid edition of the *Religio Medici* and other works of the author—published by Macmillan in 1881—should be read.

In his most famous book, the *Religio Medici*, Sir Thomas Browne speaks of his life up to thirty years "as a miracle, to relate which were not a history, but a piece of poetry." Dr. Lloyd Roberts in the opening page of his memoir quotes this passage with wonder, and I am not surprised at it. I agree with Roberts that a less eventful life was scarcely ever realised. The most stirring events were taking place during the latter half of the memorable thirty years included, but in those events Browne took no part whatever. Then, and all through his career, he seemed dead to the world outside of him and alive only to his own pursuits and reflections. A pure egoism ruled his life ; he never lived out of himself ; and it was this introspection, this reading of himself by himself, that made his life, to him, the miracle he deemed it to be. I doubt whether there is to be found anywhere in history such a truly self-contained man. In section 8, Part II., of the *Religio* he is more communicative about himself than ever. He inherits, he informs us, millions of vices from Adam, but he has escaped one, *pride*. Besides the jargon and patois of several provinces, he understands, he says, no less than six languages, yet he has no more conceit of himself than his fathers had before the confusion of Babel. He has not only seen several countries, beheld the nature of their climes, the chorography of their provinces, and topography of their cities, but he

understands their several laws, customs, and policies ; yet cannot, he declares, "all this persuade the dulness of his spirit unto such an opinion of himself, as he beholds in nimbler and conceited heads that never looked a degree beyond their own nests." He knows the names and somewhat more of all the constellations in his horizon ; yet he has seen "a prating mariner, that could only name the pointers and the North Star, out-talk him and conceit himself a whole sphere above him." These are brave words for a youth of thirty, and in modified tone they ring up to the end of his literary career.

Thomas Browne was born in the parish of St. Michael's, Cheapside, London, on October 19th, 1605 (Gunpowder Plot year). His father, also Thomas, was from Upton, in Cheshire, of a good family there, but settled in London as a merchant, and evidently a successful one, for he died early whilst his son was a child, leaving £9,000, a third of which came to his wife, and the residue to young Thomas, a brother, and two sisters. The widow, a daughter of Mr. Paul Garraway, of Lewes, in Sussex, did not remain long unmarried after the death of her husband, but became united to a gentleman named Sir Thomas Dutton, who filled some post of honour in the government of Ireland, and soon afterwards left, with his wife, for Ireland. The boy Thomas, his brother and sisters, remained under the care of a guardian, who, it is said, was rapacious, and treated the fortune of his wards as if it had been his own. However this may be, Thomas Browne was admitted to the school at Winchester on August 20th, 1616, and proceeding to Oxford in 1623, was enrolled as a gentleman commoner at Broadgate Hall, afterwards Pembroke College. He matriculated at Broadgate, took his B.A. on June 30th, 1626, and his M.A. on June 11th, 1629. He now turned his attention to physic, and practised for a short time in Oxfordshire, but left his work there in order to join his stepfather, Sir Thomas Dutton, in Ireland. He remained for a very short time in the Emerald Isle, having little to detain him in that already down-trodden and unhappy country, but went off, as gentlemen of his time usually did, to make the grand tour and become Italianised. He first visited France, and studied for a time in the great school of medicine at Montpellier, a school to which his cotemporary Kenelm Digby, as we have seen, also bent his student steps. From Montpellier, after a short sojourn in drinking Rochelle, he passed to far-famed Padua, and returning home by Leyden, graduated M.D. there in 1633. He reached England in 1634, and probably in that year moved to Shipden Hall,

near Halifax, where he commenced again to try his fortune at medical practice. He was not very successful in this place as a practitioner, but he scarcely stayed long enough to try his full measure of success. At the same time there was this advantage in Shipden Hall to the young M.D. from Leyden: he obtained full leisure to think out his learning and observation and to compose the little book that has proved the basis of his fame. He wrote here in great part, if not altogether, and in crude part certainly, the *Religio Medici*. His brain was young, his observations fresh, his confidence strong in himself and in no other man. An older mind could have performed no such feat as the production of this work. Greenhill dates its birth in 1635 with a note of interrogation. The note is wanted, but the date is not very far wrong. Browne must soon afterwards have come to London, perhaps to get the book into the hands of the printer, for printing at Shipden Hall would not be probable.

During his student life at Oxford Browne had been fortunate in having Dr. Lushington for a tutor. Lushington moved from the university to become rector of Burnham Westgate, near to Norwich; and under his persuasion, backed by that of Sir Nicholas Bacon, of Gillingham, and other influential Norfolk families, the young physician moved to the "city of orchards," as Norwich has been designated, and settled there for life, adding a living honour to the ancient and remarkable place. During the first years of his life there he still held back the open publication of his great work, but it was known and talked about nevertheless. In 1641 he married Miss Dorothy Mitcham, fourth daughter of Edward Mitcham, of Burlingham St. Peter's, a handsome lady of some family influence, and of such maternal facilities that she bore twelve children to her husband.

In the midst of the most momentous period of the history of this country, during the great fights between King Charles I. and the people, represented by their parliament; during the time when the King was beheaded; during the period when Cromwell held the reins of power and made England the mainspring of the world; during the sparkle of the Restoration and the sudden transformation of Puritan sanity into libertine madness—during all these mighty revolutions Dr. Thomas Browne, a Royalist, who had subscribed money for the King, pursued the even tenor of his way as physician and man of letters at Norwich, the city of orchards. His medical practice was considerable, but he does not appear to

have added any important detail to the practice of physic. His literary practice, if so it may be termed, continued, as we shall see, to grow and prosper. He had not been long settled at Norwich—1636—before the university of Oxford conferred on him the degree of Doctor of Physic. He was incorporated Doctor on July 16th, 1637, and thence onward held the first place as physician in the city of his adoption. His practice was, without doubt, lucrative; but his family was large, and he lived at sufficient expense to prevent the amassment of a large fortune.* He dressed plainly, but neatly, and always warmly, retaining the old-fashioned cloak and boots. He was simple and orderly in his mode of life, but his manner is variously described by different observers. Some relate that he was very reserved, others that he was open, free, and even loquacious. His friend Whitefoot, who is quoted by Johnson, Wilkin, and other biographers, and who boasted a knowledge of him for two-thirds of his life, is rapturous in his praises; but when we come to an examination of Whitefoot's description we find it is taken, considerably, from Browne's account of himself in the *Religio Medici*. Johnson, with his usual shrewdness, detected this fact, and when he copied the commendation that the famous man—who in his hands too became a hero—was one destitute of pride or conceit, winced at that statement, and admitted with a less favourable critic, Dr. Watts, "that a perusal of the *Religio Medici* will not much contribute to produce a belief of the author's exemption from the father sin, pride being a vice which pride itself inclines every man to find in others and to overlook in himself." The admission is too true. Browne was essentially a man who thought well of himself and first of himself; he knew himself, one of his

* Of his children several died in their infancy. His eldest son, Edward, rose to fame in the medical world, was elected F.R.S., and was President of the Royal College of Physicians. A second son, Thomas, whom he sent, unattended, at the age of fourteen, to France, entered the Royal Navy, showed great parts as a writer and observer of natural things, rose to the rank of lieutenant, and died probably in the year 1667, but where and under what circumstances we have no record. His eldest daughter, Susanna, married Arthur Moore, Esq., M.P. for Grantham, but died soon afterwards. His daughter Mary died in her twenty-fourth year, in 1676. Another daughter, Elizabeth, married Captain George Lyttleton, and being left a widow, retired to Guernsey; and one more daughter, Frances, remained single after her father's decease. Of forty children and grandchildren that sprang from him and his wife not one of the male line remained after thirty years, and only one family of the female line has come down into our day—namely, the Erskine family, who descended through the eldest daughter of Anne Browne, Frances Fairfax.

admirers admiringly affirms. It is quite true. He did know himself, and that is the secret why his works were born and why they were not still-born. If poor old Alexander Ross, one of his critics, sometimes called a divine, had known himself as well, he would have done better as a critic and been more successful in his opposition.

For my part, after a good course of delightful reading on the character of this brother in physic, I like best the account of him by Evelyn, who visited him in Norwich, and who formed a favourable opinion of him. "His whole house is a garden," Evelyn writes, "a paradise and cabinet of rarities, and that of the best collections, especially medals, books, plants, and natural things, amongst others a collection of the eggs of all the fowl and birds he could procure, that country, the promontory of Norfolk, being frequented by several kinds which never go further into the land. He led me to see all the remarkable places of this ancient city, being one of the largest, and certainly, after London, one of the noblest, of England." The account of this visit of Evelyn leaves a far better impression than the laudation of Whitefoot; and here for a time we will rest from personal narrative of the physician, to study for an interval the scholar and classic and taste the food of his works.

RELIGIO MEDICI.

The earliest work of Sir Thomas Browne was the *Religio Medici*. This also, taking it altogether, was his greatest work, although De Quincey and other writers have opined that in his work on *Urn Burial* there are the finest passages. Let the reader recall, before he goes further, the fact that the author of this famous little essay—for it is made up of less than thirty-four thousand words—had not seen thirty summers when he wrote it, and he may then perchance pardon any faults of expression he may find in it; perchance, too, he may marvel how so young a writer could have composed a book that created in its day so great a controversy, and since its day has retained so firm a hold on the minds of men. Had it been an allegory like the *Pilgrim's Progress*, or a narrative like *Robinson Crusoe*, or a satire like *Don Quixote*, there need have been no cause for marvel—but this essay! It is a marvel.

Upon what does its success depend?

Several causes have contributed to its success. To begin, the name of the work was singularly suggestive and taking. The Churches of all sorts had long looked askance on the science and art

of physic separated from the Churches. It had been promulgated that the medical professors had no religion, and the words, "Three physicians, two atheists," had become a common saying. This book claimed a religion for physic. It was an exposition of the faith of a physician. Let us see at last what that faith is. Is it an orthodox faith? Does it attach itself to any particular sect or creed? Is it a practical faith, likely to bear good works? Here was food for curiosity.

In the second place, the style of the book was novel. This is a fact which Johnson detected and lucidly exposed. The stability which our language had obtained in the age of Elizabeth had commenced to waver in the age when Browne took up the pen. Milton, Johnson argues very truly, had introduced the Latin idiom; Browne poured in a multitude of exotic words, many useful and significant, which rejected would have to have been supplied by circumlocution. His style indeed was a tissue of many languages, "a mixture of heterogeneous words brought together from different regions, with terms originally appropriated to one art and drawn by violence into the service of another." He thus inaugurated a philosophical diction. He had, moreover, uncommon sentiments, "and was not content to express in many words that idea for which any language could supply a single term." This novelty of style and expression, so clearly defined by Johnson, had its charm; it had its obscurity also: but that signified not so long as it was strange, forcible, and in the end alluring. It was rugged, but it was in its way poetic; and, as we have seen in one striking example in our own time, the difficulties of understanding the style rather added to than took away from its acceptability. Doubtless many read the book and liked it when they did not in the least comprehend it or desire to comprehend it.

In the third place, the very personality of the book had its influence. There were bits of autobiography in all parts, and they were sure to be popular, though self-panegyric were as clear as the day. The author tells us what he was, how he felt, how he thought, and what he did. We do not swallow all he says, and we agree with Sir Kenelme Digby that he informs us too much about himself. Never mind: it is interesting. He depicts himself as shorn of conceit and pride; we know that the very statement proclaims the opposite: he affirms that he could sit and have a limb removed without giving vent to expressions of pain; we doubt, but are not inclined to dispute, the assertion: he protests that no man living has less fear of death than he; we are not quite sure of the statement, and

yet we are satisfied with it: he praises up his great knowledge of languages, of sciences, of arts; we discover that, in spite of this praise, he does not understand or does not believe in the motion of the earth round the sun: he still believes in the mysteries of witchcraft, alchemy, and astrology; yet we permit his assertion, it is so boldly and uncompromisingly declared. In fact, this youth of thirty made men believe in him whether they willed it or not; and when a great cotemporary taught—

“A man convinced against his will
Is of the same opinion still,”

he ought to have appended a footnote: “Readers of the *Religio Medici* always excepted.”

A fourth influence which caused the work to run its bright career was its poetry. It is a prose poem from its beginning to its end; but at points it glides into actual poetry, crisp, musical, sweet.

“Search where thou wilt, and let thy reason go,
To ransom truth, even to the abyss below;
Rally the scattered causes; and that line
Which nature twists be ready to untwine.
It is thy Maker’s will, for unto none
But unto reason can He e’er be known.”

This is the opening of one short poem, remarkable for the argument as well as the style. It does not continue in the same strength, “its combinations are uncouth,” and, like Gray’s *Elegy*, it ends feebly; but, despite faults, it is attractive. In climbing the mountain of thought it is like a tree by the stem of which one can hold, and under which one can for a moment rest. Still better than the poem noticed above is the *Evening Hymn* of Browne. He is treating of sleep, and tells us sleep is so like death, “he dares not trust it without his prayers, and in half adieu unto the world takes his farewell in a colloquy with God.” I have often compared this evening hymn with the popular one of Bishop Ken, which so many of us learned and sang in childhood, and, for my part, I like this the best. How gentle and pure the opening lines!—

“The night is come, like to the day;
Depart not Thou, great God, away:
Let not my sins, black as the night,
Eclipse the lustre of Thy light;
Keep still in my horizon, for to me
The sun makes not the day, but Thee.”

How simply grand also the definition and invocation of sleep!—

"Sleep is a death ; oh, make me try
By sleeping what it is to die,
And as gently lay my head
On my grave as on my bed :
Howe'er I rest, great God, let me
Awake again at last with Thee ;
And thus secured, behold I lie
Securely or to awake or die."

This was the "dormative he took to bedward." It needed no other laudanum to make him sleep ; after that he closed his eyes in security, content "to take his leave of the sun and sleep unto the Resurrection."

Most readers will see the analogies between this hymn and that of Bishop Ken :—

"Teach me to live that I may dread
The grave as little as my bed ;
Teach me to die that so I may
Rise glorious at the awful day."

There, in rounder and more rolling rhythm, is similar thought so similarly rendered, it looks as if Ken had merely paraphrased Browne ; but the probability is, as Greenhill acutely observes, that both poets, scholars of Winchester, found in the old songs and hymns in use amongst the scholars, the originals on which, according to their genius, both Browne and Ken tuned their lyre and left their music on the ear of the world.

I have assigned now several, and perhaps sufficient, reasons why the *Religio Medici* took and retained its hold on men—on men, not women, for until quite lately it has been too exclusively a man's book. But there is another, and much more important, reason for its success : it is a book that leaves behind it a mystery, and a mystery is of all things that thing which the mind of man most loves. Mystery belongs to us as a divine mantle in which we are enshrouded, a living winding-sheet. The sun, moon, stars, earth, air, animals, plants, our own bodies and minds, all are mysteries. We are mystery, and what we are we dream of most in our waking dreams. Even when we believe we know we are still mysterious. As Madame de Staël aptly expressed it, "What we know is as inexplicable as the unknown." Ah, wise Madame, so it is ! And this book, ever a mystery, remains a mystery.

What is the religion of a physician, after all? That was the question the world asked and asks of the *Religio Medici*. In the first days of the book, a Roman Catholic argued, "This is the book of a believer in the true Church"; a Quaker speculated, "This book must be by one of my community of thought"; the illustrious Bayle, after pithing it mercilessly, says, "The *Religion of the Physician*, which, according to some, might be intitled *The Physician of Religion*, is a work of such a cast that many have imagined the author of it a little remote from the kingdom of heaven"; and Guy Patin, one of the learned in physic, acknowledging that there are many fine things in the book and a pleasing melancholy in the thoughts of it, says of the author of it that he has, like many others, a religion to seek, and perhaps will find none at last.

Putting aside the vehemence of Alexander Ross—who, by the way, I rather admire as a faithful and candid writer, very little read even by the religious community—we see that to staid and learned men the *Religio Medici* was a stumbling-block. I am quite sure that Samuel Johnson, though in the end he made up his mind to take the volume under his wing, had fearful flutterings of the heart and twinging doubts before he put it under his wing. And so to this day it remains a doubt. It may be worth while, having given some reasons why the book took hold of the world, to glance at it for ourselves and read it face to face with the best desire to comprehend it in its depth as well as its simplicity.

When, in 1864, I had in my hands the skull of the author of the *Religio Medici*, I determined to make a careful study of the book, and in a few weeks had, I believe, the contents of it as tightly in my brain as ever it was in the skull in which it was generated. The book fascinated me; and although I almost learned it by heart, it was a close puzzle. Under first impressions I wrote down the idea, for reasons the book itself supplied, that it was satire, having then no knowledge that other readers, some of whom were masters in criticism, had come to the same conclusion. Since 1864 this book has been a bedside companion, one of the chosen companions I keep by my couch and read in early morning once yearly, in order to remain well up in them. Longer reflection and more extended communion with this book have rather modified my earlier views, although I am still forced to recognise a vein of satire running through it. I perceive with Bayle it is not so truly the religion of the physician as it is the physician of religion. I see, too, that, as a religion of the physician, it is not one of the physician in his universal acceptance, as most

suppose, but the religion of the one physician who composed it, Dr. Thomas Browne. It could not be the religion of all the faculty, but it could be that of one of the faculty, and there it must remain, fanciful, satirical, contradictory, yet as earnest a work as any young man could under the circumstances have written.

To understand the argument, if that can be styled an argument which consists of disjointed propositions clothed usually in roughly decorated language, requiring to be mastered step by step before the end is gained and the intention seen, it is essential to recall the environments in which it was conceived. The majesty of the Catholic Church of Rome had then departed from the minds of men of the class to which Browne belonged, except in such instances as that of Kenelm Digby, where heredity carried the majesty almost intact. At the same time the religion of the Puritan and Presbyterian, the Baptist, the Anabaptist, and the other sectaries was to this author harsh, low, vulgar. He therefore found refuge in the reformed Church of England, with sufficient ceremonial in the services of that Church to give poetry to them and a mixed system of learning as well as worship. That is not all. He was smitten with science, not deeply, not by experimental personal labour like Galileo, nor by psychological labour like Spinoza, but by a kind of secret sympathy which he dared not fully confess even to himself. In the dilemma he strove to bring up reason to the bar of faith, and when in the attempt he found reason compatible with faith he was satisfied; whilst, when he found what he called reason in opposition to faith, he gave reason its *congé* and let faith stand alone.

This is the key of the mystery, the real *Religio Medici* of Thomas Browne the physician. When rebellious reason puzzled him, he preferred to lose himself in a mystery up to an "O altitudo"; and when in the name of reason the devil ensnared him, he was content to run for protection into the paradox of Tertullian, "This is certain, because it is impossible"—*Certum est, quia impossibile est*. He believed, under the lure of faith, there was a tree in the garden of Eden whose fruit our unhappy parents tasted, "though in the same chapter of the book of Genesis in which God forbids it 'tis positively said the plants of the field were not yet grown, for God had not caused it to rain on the earth." He believed in fact, so at least he attested, all to be true which, indeed, his reason would persuade him to be false, and thought it no vulgar part of faith to believe a thing not only above, but "contrary to, reason and against the argu-

ments of our proper senses." "The following words of the Gospel ought, therefore," says philosopher Bayle, "to be applied to him: 'I have not found so great faith, no not in Irsael.'" Because of the witch of Endor and of other references to witches in the Bible, he believed in witchcraft; and later in his life positively assisted at a trial at Bury St. Edmunds, over which Sir Matthew Hale presided as judge, in sending two poor miserable wretches to death for giving fits to one or more who died from epilepsy. "The fits," he swore, "were natural, but heightened by the devil's co-operating influence with the malice of the witches, at whose instance he did the villainies." Uncompromising admirers of Browne regret this evidence on witchcraft; I regret the foul result of it as much as any one, but I feel, notwithstanding, that it clears the author of *Religio Medici* of the fouler offence of writing in satire what he did not believe and of being as bad as the Machiavel whom he scathingly condemns.

It might be expected that these arguments of faith *versus* reason would have secured Dr. Browne from all charges of Atheism, Deism, or other schismatic or heretical opinion. They did not protect him. The Pope placed the book in the Index Expurgatorius, although the author went so far as to commend or at least favour the system of praying for the dead and showed sympathy with Roman ceremonial. The sectaries opposed it as a dangerous book all round.

Where lay the danger? The danger lay in two directions. In one direction, a certain dogma at that time intensely popular amongst the Presbyterian community was pushed to its logical end with an apparent force and subtlety that raised an issue beyond ordinary exposition or argument. Whether Browne were an Augustinian or a Pelagian I know not; but either really or satirically he professed an absolute faith in election and predestination which "Holy Willie" himself could not have beaten. "The world," he says, "was before the Creation, and at an end before it had a beginning; and thus was I dead before I was born: though my grave be in England, my dying place was paradise; and Eve miscarried of me before she conceived of Cain." Was this the *argumentum ad fidem vel absurdum*? Who could decide? In another passage he speaks of himself as overjoyed that he had not seen either Christ or His Apostles, and that he did not live in the age of the miracles, for his faith had then been involuntary, and he would have had no share in the following blessing: "Blessed are they that have not seen, and yet have believed."

That burning tongues on religious subjects should throw doubts on the sincerity of an author who appeared to protest too much was not in the least surprising ; and, without doubt, the opposition was aggravated by the liberal introduction of scientific assumption which to the mind of the world generally was new, and to part of that mind terrible. For example, he seized the text, "All flesh is grass," and on that preached not only its metaphorical, but its literal truth. All creatures, he declared, are but herbs of the field digested into flesh in them, or more remotely carnified in ourselves. "Nay, further," he continued, "we are what we all abhor—*anthropophagi* and cannibals, devourers, not only of men, but of ourselves, and that not in an allegory, but in a positive truth, for all this mass of flesh which we behold came in at our mouths ; this frame we look upon hath been upon our trenchers ; in brief, we have devoured ourselves." Who need be surprised that a man writing such wild heresy in the era of the Commonwealth should be doubted ? Why, the dread of it has not passed away now, for when in one of my own lectures I explained that all flesh is grass, that the lower animals of the herbivorous class are our laboratories, and that the pure carnivora could not live without their interposition ; and when, going a little further, I suggested that we ought to learn in our chemical laboratories how to transmute the grass of the field and other vegetable substances into food as condensed and nutritive as animal foods, my teaching was received as heretical, at best a dream of science, and something about which the least said the soonest mended.

The author of the *Religio Medici* himself was not blind to the objections that would be made to his work. He let it appear at first half authoritatively in print, and in the hands of Croke, the publisher, who sold it. The process was a pioneering one. The book got into the possession of Kenelm Digby, who animadverted upon it too hastily, truly, but with signal ability. In its nascent state it floated several years before its parent owned its origin ; and when, at last, he put his name to the volume and "included" it with his life, he confessed that there were many things in it "to be taken in a soft and flexible sense, and not to be called under the rigid test of reason." Also he "submitted all that is contained in the volume unto maturer discernments, and would no further father them than the best and learned judgments shall authorise them."

I have traced now, I trust fairly and honestly, the mental construc-

tion of the *Religio Medici*. In epitome it is made up of the thoughts of a young medical poet: thoughts written in solitude; thoughts of a mind in which science had struck a spark that would not go out, and yet could not burst into flame; thoughts of a mind in which, as in the mind of Shakespeare, the glorious realm of the supernatural, the angel, the spirit, the fairy, the devil, the imp, the witch, the wizard, the physical heaven, the physical hell, still held place and power; thoughts of a man in whom religious faith controlled reason; a man who, distinguishing plainly his difficulty, met it by such extreme acquiescence in faith, he seemed to scoff when he really prayed, and whose book was, and remains, a mystery because of the very simplicity and sincerity of its heart. To me once a satire, it breathes now a confession of a struggling scholar, of a true child of science, a poet striving to read from nature, understanding some parts, but closing the page as undecipherable and too fearful to be pursued whenever doubt proved traitor.

Of all books in the English language the *Religio Medici* has, I believe, had bestowed upon it the most fostering care. It was famous from the first. A Mr. Merryweather turned it quickly into what Johnson terms "not inelegant Latin," and from Merryweather's edition it was translated into Italian, German, Dutch, and French. Of English editions, with in some cases other works of the author and biography—one of which made the literary reputation of an Oxford student named Chapman in 1831—Greenhill reckons up thirty, to which must be added his own precious edition and two others published at popular prices in 1892. The care Greenhill has bestowed on his edition is wonderful. His table of contents supplies an analysis of the *Religio* and of *Christian Morals*, giving in short sentences the texts of the author in a style most comprehensive and instructive. In fact, it is a model of editorial skill, in which industry contends with accuracy, and both with erudition.

INQUIRIES INTO VULGAR AND COMMON ERRORS.

"Browne," says Johnson, "having entered the world as an author, and experienced the delights of praise and molestations of censure, probably found his dread of the public eye diminished; and therefore was not long before he trusted his name to the critics a second time, for in 1646 he printed *Inquiries into Vulgar and Common Errors*." This book, a much more extended labour than *Religio Medici*, is free of all fancy and full of detail. It was published in 1646, and soon

appeared in second and third editions under the hand of its author. I am writing with a fine copy of the third edition, once the property of Henry Kirke White, before me. The title-page is printed *Pseudodoxia Epidemica; or, Inquiries into very many Received Tenets and Commonly Preserved Truths, corrected and enlarged by the Author, with Marginal Observations and a Table Alphabetical at the End.* Date 1658. Publisher, Ekins, at the Gun in Paul's Church-yard. It is a volume of 326 closely printed quarto pages, and is filled with curious notices and corrections, and, if the truth must be told, errors of its author. It is strange to read now "that Satan deceives man by trying to make man believe that apparitions and such as confirm his existence are either deceptions of sight or melancholy depravements of phancy; and that he (Satan) endeavours to propagate the unbelief of witches, whose concession infers his co-existency." It is marvellous to find here an argument that the earth is a fixed body, and that the sun moves round it; still more astounding is it to discover a physician classing amongst vulgar errors the fact that the heart of a man lies on the left side, and that, strictly taken, the heart is seated in the middle of the chest. These and many other similar statements are indeed peculiar, and make one prefer to call the book by its original title alone: *An Inquiry into very many Received Tenets and Commonly Preserved Truths*, rather than into vulgar errors, as he (the author) does later on. But, with all these lapses of his time, Browne has some acute observations on various subjects, savouring, however, rather of criticism than of refutation. Thus Aristotle, having noted that the horse has no gall-bladder, directs attention to the fact, and draws the inference that whole-hoofed animals have no gall. This inference he, Browne, sets down as a vulgar error, because, "although the horse has no bag or vesicle which long containeth this humour, the gall, yet there is a manifest receptacle and passage of gall into the intestines, which being not so long detained as it is in other animals, procures the frequent excretion in this animal." The criticism is sound and ingenuous, but it is rather the correction of a scientific oversight of a great master than of a vulgar error. To be brief, though there is some science in the book, it is crude, and often itself superstitious, with no terms in it, unless we admit one, "hip gout" for sciatica, that need be prized. Thomas Willis would have scorned such a treatise; Harvey would have disowned it; and it is almost certain that if it had preceded the *Religio Medici*, both works would have passed into obscurity of obscurity.

HYDRIOTAPHIA—URN BURIAL.

It is refreshing to turn from *Vulgar Errors* to the classical and beautiful treatise on Urn Burial, a discourse on some sepulchral urns found in Norfolk, published by Browne in 1658, with an epistle dedicatory to his worthy and honoured friend Thomas Le Gros, of Crostwick, Esquire. Some urns had been found in a field at Old Walsingham, between forty and fifty of them, deposited in a dry and sandy soil, not a yard deep nor far from one another. These formed the text of a discourse in which the author shines at his best. He returns here from imperfect detail into his own plaisance of poetry and history. The opening lines in the epistle are truly magnificent, so musical, so far away from the earth, and yet so embedded in it:—

“But who knows the fate of his bones, or how often he is to be buried? Who hath the oracle of his ashes, or whither they are to be scattered? The reliques of many lie, like the ruins of Pompey’s, in all parts of the earth; and when they arrive at your hands, these may seem to have wandered far, who, in a direct and meridian travel, have but a few miles of known earth between yourself and the pole.”

In studies such as those before him he saw the sphere of the learned physician. In his previous work he had commended the out-of-the-professional-way labours of William Gilbert; now he commends his own work of the same extra day character:—

“Beside, to preserve the living and make the dead live, to keep men out of their urns and discourse of human fragments in them, is not impertinent unto our profession, whose study is life and death, who daily behold samples of mortality, and of all men least need artificial mementoes or coffins by our bedside to mind us of our graves.”

There are five chapters on Urn Burial. Each is rich in history, philosophy, fancy, with touches here and there of science and once of scientific discovery, for he tells us that “in an hydropical body, ten years buried in the churchyard, he met with a fat concretion where the nitre of the earth and the salt and lixivious liquor of the body had coagulated large lumps of fat into the consistence of the hardest Castile soap, whereof part remaineth with us.” This was the actual discovery of the substance since named *adipocere*. He favours cremation on several grounds, among others one that “to be knaved out of our graves, to have our skulls made drinking bowls and our bones turned into pipes to delight and sport our enemies, are tragical abominations escaped in burning burials.”

The choicest pieces on urn burial are in snatches, proverbs, or shall I not rather call them texts? Here are a few:—

"We slightly remember our felicities, and the smartest strokes of affliction leave but short smart upon us."

"Sense endureth no extremities, and sorrows destroy us or themselves."

"Afflictions induce callosities; miseries are slippery, or fall like snow upon us, which notwithstanding is no unhappy stupidity."

"To be ignorant of evils to come and forgetful of evils past is a merciful provision of nature."

"Life is a pure flame, and we live by an invisible sun within us."

"Diuturnity is a dream and folly of expectation."

"Our days become considerable, like petty sums, by minute accumulations, where numerous fractions make up but small round numbers."

"There is nothing strictly immortal but immortality."

CHRISTIAN MORALS.

After the death of Browne, his daughter, Mrs. Elizabeth Lyttleton, dedicated to David, Earl of Buchan, a posthumous treatise of her father entitled *Christian Morals*. The Archdeacon of Norwich, John Jeffrey, D.D., prepared it for press; it was printed at the University Press, Cambridge, for Cornelius Cromfield, printer to the university, and was published by Knapton, of the Crown in St. Paul's Churchyard, in 1716. Several editions of this work have been since published. Greenhill reckons up thirteen, to which must be added his own and two at least of later date. I do not wonder that *Christian Morals* should be a favourite tract, for it is of fine quality, free of all cant, full of sound philosophy, heathen, if the word be not a misnomer, as well as Christian. The keynote of it is that "the created world is but a small parenthesis of eternity," and the true moral of life to live under this impression. Here again text follows upon text, line upon line, precept upon precept. There are also touches of original quality which indicate the close observer. What would Gall and Spurtzheim have said to the following passage as a forecast of phrenology?—

"Since the brow speaks often true, since eyes and noses have tongues, and the countenance proclaims the heart and inclinations, let observation so far instruct thee in physiognomical lines, as to be some rule for thy destination and guide for thy affection unto such as

look most like men. Mankind, methinks, is comprehended in a few faces, if we exclude all visages which any way partipate of sympathies and schemes of look common unto other animals."

This is but one taste of many good things which every true student of medicine who would "swim smoothly in the stream of his nature and love but one man" should learn. I would I could afford to extend these pages more widely for the wisdom of this book of goodness undefiled, but I have expanded too much already and must summon the conclusion.

MISCELLANEOUS WORKS AND LETTERS.

There are a few other papers of our author that call for brief notice at least. *A Letter to a Friend upon the Occasion of the Death of his Intimate Friend*, published for Charles Brome, of St. Paul's Churchyard, is a touching, though rather discursive, narrative with some medical teachings in it that deserve remembrance. Browne attended this sick man, and was struck by an "odd mental symptom not mentioned by Hippocrates": that he (the sick man) "lost his own face and looked like some of his near relatives; for as from our beginning we run through variety of looks before we come to consistent and settled faces, so before our end, by sick and languishing alterations, we put on new visages, and in our retreat to earth may fall upon such looks, which, from community of seminal origins, were before latent in us." An excellent and true lesson in diagnosis.

As an addition to the little work on Urn Burial, he wrote *The Garden of Cyprus; or, The Quincunxial Lozenge, or Network Plantation of the Ancients, artificially, naturally, mystically Considered*, a fanciful sketch, deducing the practice of horticulture from the earliest antiquity to the time of Cyrus, who first planted a quincunx, and dealing with the importance of the number five.

The letter to a friend written in 1672 is considered to be the last work, in set form, of this author, and here all special notices may end, with one exception. There is extant a letter which he wrote in 1647 to Dr. Henry Power, of New Hall, Yorkshire, on the *Education of the Practitioner of Medicine*, a letter which, as indicating the most advanced study of physic in the middle of the seventeenth century, is worthy of note. Men, he tells Power, can never become physicians from books, but "Galen and Hippocrates must be read as fathers and fountains of the faculty. Lay your foundation in anatomy; read also Vesalius, Spigelius, and Bartholinus; be sure to make yourself master

of Dr. Harvey's piece *De Circul. Sang.*, which discovery is preferable to that of Columbus ; study plants, animals, and minerals, the *materia medicamentorum* ; be not a stranger to the useful parts of chemistry ; and so by degrees march on. Having learned anatomy, read two or three times over Sennertus's *Institutions*, after which you will seldom meet with any point in physic on which you will not be able to speak like a man. See how institutes are applicable to practice, but in reading satisfy yourself not so much with the remedies set down as with the true understanding of the nature of the disease, its causes, and proper indications for cure. If at one view you would see who hath written and upon what diseases, by way of counsel and observation, look upon Moronus's *Directorium Medico-practicum*. You may look upon all, but dwell upon few. The words of art you may learn from Gorreus's *Definitiones Medicæ*."

SIR THOMAS BROWNE.

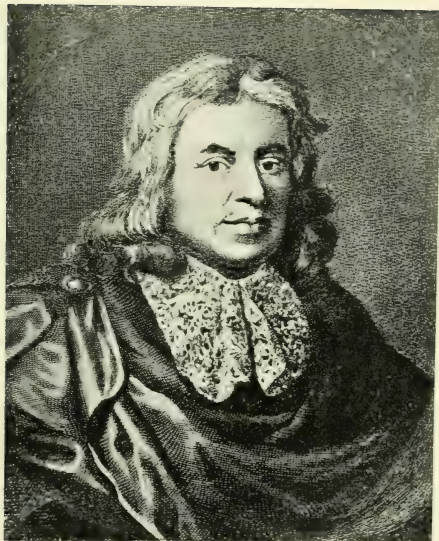
Returning to a final interview with the illustrious man of genius whose works we have surveyed, I may, before bending my last adieu, glance at the final stage of his earthly career. In December 1665 he was admitted as Honorary Fellow of the Royal College of Physicians by special diploma. On September 28th, 1671, King Charles II., with what Wilkin correctly calls "his profligate court," visited Norwich from Newmarket. In this visit to the ancient city the King wished, as Johnson says, to reward virtue "with what cost him nothing," and therefore offered knighthood to the Mayor. The Mayor, for some reason little known to mayors generally, prayed off the honour, which thereupon was thrust on the great doctor of the city, henceforth Sir Thomas Browne. From this date, still widely known and beloved, and ever with his hands full of work, he wore his well-earned fame, became wealthy, made his will on December 2nd, 1679, and on the day of his nativity, October 19th, 1682, succumbed to an attack of colic, and, as he would have declared, "resigned his soul to the God who gave it."

Thomas Sydenham, M.D., and Hippocratic Physic

IN the three last biographies I have studied three historical characters, all of one nation, and all belonging to one peculiar and critical time in the history of the English people and of medical art. Thomas Willis, Kenelme Digby, Thomas Browne, have passed before us : the first, the profound physiological physician ; the second, the versatile scholar in philosophy, including physic in some of its departments ; the third, the antiquarian, and I had almost said theologian of medicine, the poet and the practitioner, strange as the combination was and ever will be—Sir Thomas Browne.

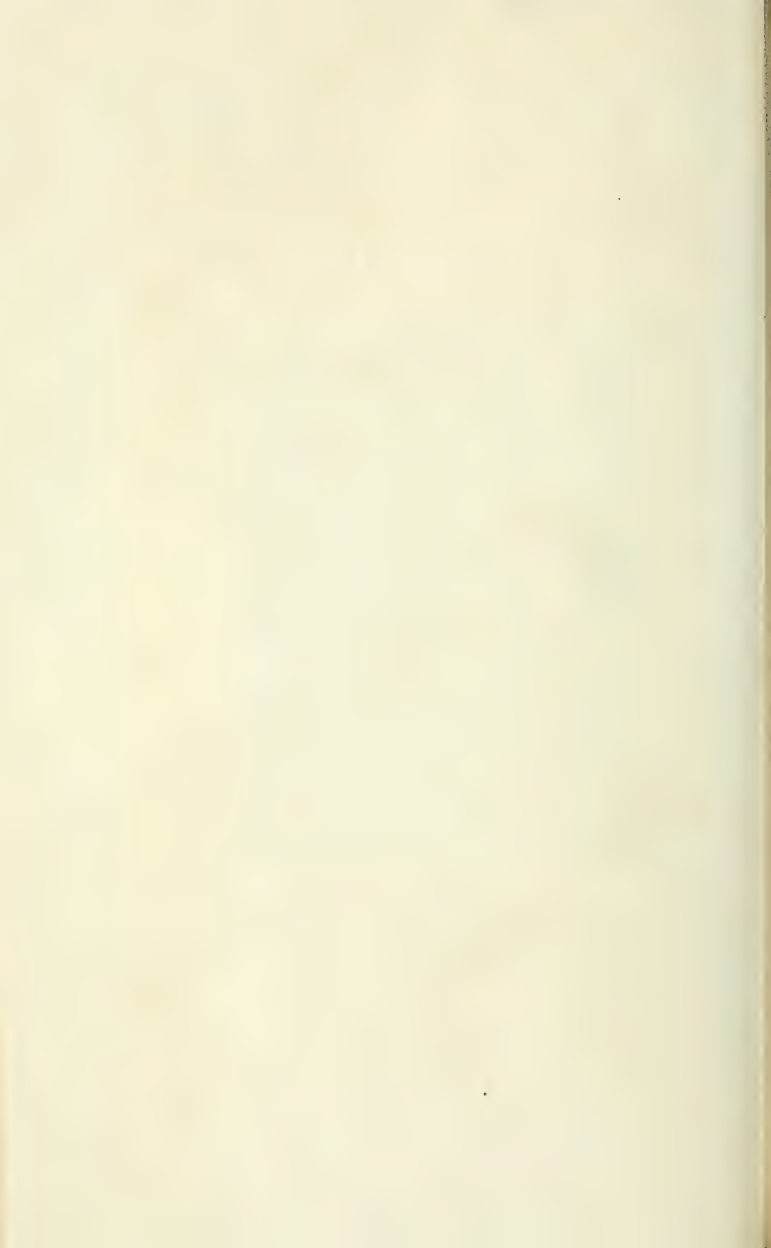
I pass now to a man of the same time, a man of very different quality of mind from either of his distinguished cotemporaries, a man who has made in the family of medicine by far the deepest impression ; a man whose practical work is still in our exclusive fraternity a household word—Thomas Sydenham. Why Sydenham has left so indelible a mark in medicine is a question we shall have to discover in the course of this essay. He had none of the genius of Willis, or the learning of Browne, and yet his name is spoken now a hundred times to one compared with either, nay both. In fact, dead and gone as he is, he lives yet amongst us. We gild a society with his name. An American physician of the past rejoiced most when he was designated the modern Sydenham, as Sydenham might have rejoiced at hearing himself called the modern Hippocrates. I remember the late Sir Thomas Watson being compared to Sydenham, and he told me that he had never felt himself more honourably mentioned.

There must have been some remarkable mind in this man to win such ever-progressing admiration. Let us look at him in his mortal life as best we can.



THOMAS SYDENHAM, M.D.

From an engraving by Goldar, after a painting by Sir Peter Lely, in the possession of John Sydenham.



EARLY CAREER.

It is agreed on all sides that we have very little knowledge of an exact kind of the early career of Sydenham. We know that his father, a gentleman of good position, was William Sydenham, of Winford Eagle, in Dorsetshire. His mother was Mary Geffery, daughter of John Geffery, of Catherstone. He had five brothers : William, the eldest, Francis, John, George, and Richard ; and three sisters : Mary, Elizabeth, and Martha. He himself was born in 1624, at a time when his parents had been married thirteen years. The family seems to have been Parliamentary in a political point of view, and to have fought well on the Parliamentary side. William became a colonel in the parliamentary army, and was for a time Governor of the Isle of Wight and Vice-Admiral of that island and of Hampshire. Francis was major of a regiment, and, as Dr. Nias has recently shown, John and Richard were both captains on the same side. One of his sisters, Martha, married into a Parliamentary family, being the wife of a lawyer named Lawrence, a staunch republican.

It is a curious circumstance that the mother of Sydenham and his brother Francis were both killed in the wars, but not at the same time. In some way Mrs. Sydenham was killed by a royal officer, one Major Williams. Afterwards, in November 1664, a fight took place at Poole, in Dorset, between the King's troops, under the command of Sir Lewis Dives, and a body of Parliamentarians, under Major Francis Sydenham. In one of the charges Major Sydenham recognised Major Williams, by whom his mother had been slain, and, coming up to him, slew him and put his men to flight. In the same year he (Francis Sydenham) was himself slain.

It is supposed that our Sydenham in his early life had charge of a troop of horse on the republican side ; and, as Dr. Gordon Latham skilfully contends, there is excellent reason for believing this to have been the case, but proofs of a direct kind are still wanting. We get a glimpse of our man as a youth of eighteen years of age at Magdalen College, Oxford, in 1642, but he did not remain there for a long period. Oxford became a garrison of the King, Charles I., and the centre of the Court. Harvey and Willis and Digby were there as staunch Royalists ; but Sydenham left for London, "and did not," says Ward, "bear arms for him as other scholars did." He came to London, where his brother William was then located, and while there met with a physician, Dr. Coxe, who was in attendance on that brother in a serious illness. Coxe made, it is thought, a great

impression on Sydenham, and persuaded him to give up everything in order to devote himself to the study of the science and art of medicine.

When, after the great fight at Naseby (1645), Oxford surrendered and the King's cause was lost, Sydenham returned to the University city and resumed his studies at Magdalen, but only for a short period. There was a great turn-out of the Royalist Fellows and Dons in the colleges, with substitution of men who were on the popular side. Sydenham shared in the spoil. He was elected a Fellow of All Souls' in place of a Royalist Fellow whose name does not transpire, and he at once took residence in his new home, and began to study physic, it would seem exclusively, for he took no degree in arts, but in 1648 went up for his Bachelorship of Medicine, and was duly admitted.

For some years, it is not very easy to say how many, he remained in Oxford, it is most likely in All Souls' College as a Fellow. From a statement made by Desault it is believed by some that he went through the process of education then common in medicine, of visiting Montpellier and studying at that far-famed school. Dr. Latham accepts this view, but there is nothing in the writings of Sydenham that sustains the idea, which is at least remarkable.

Sydenham lived in Oxford until a little time before the death of the Lord Protector, an event which occurred in 1658. Until lately all the biographers have agreed that he did not settle in London until the year after the Restoration (1661), but Dr. Gee and Dr. Nias have recently fixed the event for 1656. He must have been married soon after he came to London, and from the fact that he left an annuity to his wife's mother, Mrs. Catherine Gee, it is implied that his wife's maiden name was Gee. By her he had three sons—William, Henry, and James—the first of whom entered at Pembroke College, Cambridge, in 1674, and followed his father's profession.

He settled first to practise in Westminster, in a house on the site of Ram's Mews, in King Street. Afterwards, on the Restoration, he removed, in 1664, to a house on the north side of Pall Mall, next to the sign of "The Pestle and Mortar," where he remained until 1689. His practice here was great; and there also he had pupils, including Hans Sloane, the future founder-in-chief of the British Museum, Thomas Dover, the inventor of the splendid preparation that still goes by his name (Dover's powder), and Bartholomew Beale, son of Mrs. Beale, an artist of much renown.

It has been brought against Sydenham that he was one of those

who ran away from the Plague of London in 1665. Dr. Nias explains on this point, if it be true, that at the time he would be "living in a neighbourhood which the inhabitants had deserted, and was therefore probably left with but little to do. Also his wife must have been bearing him a family, which was another reason for going."

Two years before the advent of the Great Plague, namely, in 1665, he appeared before the Censors of the Royal College of Physicians for the license of the College. He was examined at the College on April 24th, May 8th, and June 5th for the license, and was granted it on June 23rd, 1663. At that time he would be thirty-nine years old, and would be fully embarked on his professional career as a metropolitan physician. That he rose quickly into fame is testified by all cotemporaries. "He lived," says one of his biographies, "in the first degree of reputation and in the greatest affluence of practice for many years, without any other enemies than those which he raised by the superior merit of his conduct, the brighter lustre of his abilities, his improvements of his science, and his contempt of pernicious methods, supported only by authority, in opposition to sound reason and indubitable experience."

He was clearly a man of strong determination and of original observation in his own ways of thought and action. He wrote from what he saw in medicine, and his sphere was the sick-room. The sick were always on his horizon. He had not many remedies, and what he had he used sparingly; but he did his work with precision, and therefore with confidence. He read few books written by men, but he read men as books, wherein lay his original power. Sir Richard Blackmore, who knew him, tells a story of him that once when he (Sir Richard) asked him what books he should read to qualify him for medical life, he got for reply: "Read *Don Quixote*; it is a very good book; I read it still." This was not exactly advice; it was humour bordering on gentle satire. Sydenham knew his man, and bade a Quixotic nature follow its own bent. He held no public position in any of the hospitals of the city, and, singularly enough, took no rank beyond that of a Licentiate in the Royal College of Physicians. He did not seem to be ambitious for any post of honour. Sir William Browne dwells on this point, declaring that "the order of Licentiate of the College was a title high enough to content the great Sydenham, our British Hippocrates, to his death. Nor did he think it an indignity to his doctor's degree, or the university that conferred it; nor did he choose to exchange it for a higher, so remarkable was his modesty as well as his ability;

although our Society—the Royal College—would have received with open arms one who was so great an ornament to it even as a Licentiate—one who must have added even to its highest honours.”

I quote this passage in full in order to sustain what the learned Harveian Librarian of our day, Dr. Munk, has to say bearing upon the vexed question of Sydenham's relationship to the Royal College. Lettsom affirmed to a past generation that Sydenham was visited by the envy and enmity of the Fellows of the College. “I am unable,” says Munk, “to discover any grounds for the assertions of Dr. Lettsom. That Sydenham had opponents, and even enemies, among his cotemporary physicians, his own reiterated statements forbid us to deny. There is certainly no reason to suppose that such feelings attached peculiarly to the Fellows of the College—much less that it influenced them in their collegiate capacity. On the contrary, whenever Sydenham is mentioned in the Annals, it is in terms of respect and admiration.” This view, the same author contends, is supported by the wording of a grace of the College granted to Sydenham when application was made by him for permission to print a second edition of the *Schedula Monitoria*. Permission was given “*lubentissimè*,” most willingly—a term used quite exceptionally on such appeals. It is obvious that Sydenham's failure to be enrolled a Fellow of the College was not from mere envy, nor from any special enmity of the College in its corporate capacity; neither need we attribute it to any special modesty on his part, since modesty overstrained may become an obstacle to the usefulness an able and active man may render to a good cause. I take it that the reason was really political. When Sydenham graduated Bachelor of Medicine, in 1648, King Charles was on his defence, and the Parliament was taking unto itself the supreme power. Five years later Cromwell was at the head of affairs, and remained in that position until his death in 1658; in 1660 Charles II. was restored as king. Sydenham had resided in Oxford during almost the whole period of the Commonwealth, and part of the time at least as a Fellow of All Souls' College, as a Commonwealth Fellow. It is not unfair to conclude that on the Restoration his connection with All Souls' was broken in favour of a Royalist, and that, coming to London, as he did, very shortly before the resumption of royal authority, he would be at a distance with all the royal institutions, of which the Royal College of Physicians would be amongst the most prominent. We could see, too, there would be difficulty in admitting him to the Fellowship. He had a right to ask examination for the license, but for an honour which came by

spontaneous selection and grace he could scarcely look, and he would be too proud to solicit it. He would therefore be content with that which he had won, and would rest on his own ability for the success he wished to achieve. For the same reason he would not seek admission into the newly formed Royal Society, although one of his papers received notice in its *Transactions*. In brief, a Commonwealth man and physician in the midst of a Royalist community, elate with the Restoration triumph, would have enough to do to hold his own, without striving to add to his name an accumulation of adverse honours. Moreover, he was just the man to be honest in his convictions, and accept nothing from favour that he could not hold from conviction. Let, then, all the scandal—for it is nothing less—respecting Sydenham and the Royal College of Physicians pass into silence. Let puritan Lettsom himself be silenced. Sydenham was a martyr, if there were any martyrdom in the case, to the force of circumstances over which he had no control, not to any malevolence of his compeers. Every man of good mark suffers more or less from force of circumstances, just as some men of no mark at all, or less than no mark, rise from force of circumstances, and are lifted *volens volens* into an eminence to which they have no right either by ability or good reputation.

One other difficulty, technical but powerful, stood also in the way of the College. The statutes of the College ordained that for a physician to be raised to the Fellowship he must be a Doctor of Medicine. He could not even be a candidate with a lesser degree. But Sydenham came forward simply as a Bachelor of Medicine to London, and was content to enter into and continue in practice on that degree. He was not, therefore, for many years eligible for the Fellowship; and when, in 1676, he proceeded to take his Doctorate, not from Oxford, but from Pembroke College, Cambridge, he was so established in fame that it was of no moment to him to possess new distinctions or honours. There is nothing lost. If we Fellows of the Royal College regret the absence of his name from our lists, the Licentiates have their revenge. His name immortalises their calendar.

THE WORKS OF SYDENHAM.

Methodus Curandi.

The works of Sydenham are not numerous. Wallis puts them, in his translation, into two volumes of 480 pages each; and in my

comments I shall follow chiefly his copy. In the Royal College of Physicians there is a MS. copy in English of his *Observationes Medicæ*, presented on November 17th, 1795, by Mr. Paul Vaillant. This was not known to Wallis, but it does not add anything new.

The first great work of Sydenham, published in 1666, *Methodus Curandi Febris Propriis Observationibus Superstructa*, is enriched by a preface. A preface may be the most important part of a work, and in one sense it is so here. The preface shows us the mind of its author. He would always, he says, have esteemed himself a useless member of society had he not communicated his mite towards the improvement of physic; and upon this account, after long deliberation and many years of close and faithful observation, he resolved to communicate his thoughts relating to the manner of making further advances in physic, and of publishing a specimen of his endeavours in this way. Having thus declared his object, he next states his opinion as to the method in which physic is to be advanced; and it is at this point he offers the method so peculiar to himself. It is here that he falls back upon the Hippocratic line of research. Here he affirms what would be to-day as novel as it was in his own day. Suppose a teacher were now to rise and affirm: "You of to-day are experimental, physiological, abstruse, laboured. You strive to find out in the domain of disease methods that shall be applicable to the treatment of disease. You are wrong, all of you: disease can only be studied, comprehended, mastered, by keeping your minds concentrate on the field of disease. Give up experimentalising, give up speculation, give up all exoteric influences; keep to your text in its purity, the natural study of disease itself. That is what Hippocrates did; that is what you must do. The fathers of physic had no knowledge of your methods; therefore it was impossible for them to formulate any practice on your methods. They saw disease as an aberration from healthy nature, and they tried to put things right by what they learned from direct observation. You must do the same." Suppose a man declaring this at the present hour. That man would be the echo of Thomas Sydenham. Here are his words in their integrity:—

"The improvement of physic, in my opinion, depends:—(1) upon collecting a generic and natural description or history of all diseases, as far as can be secured; and, (2) laying down a fixed and complete method of cure."

This is the keynote of the Sydenham practice of medicine. What

should we say to it in this day? But we must follow it up on its original basis into details :—

“All diseases ought to be reduced to certain and determinate kinds, with the same exactness as we see it done by botanic writers in their treatises on plants. The distribution of distempers into kinds must not be done to serve the purpose of some hypothesis founded upon the true phenomena. To this cause is owing that the *materia medica* is so immensely enlarged, and yet with little advantage to the diseased.

“In writing the history of diseases every philosophical hypothesis which has possessed the writer in its favour ought to be totally laid aside, and then the manifest and natural phenomena of diseases, however minute, ought to be noted with the utmost accuracy, imitating in this the great exactness of painters, who in their pictures copy the smallest spots or moles in the originals. Again, in describing any disease, it is necessary to enumerate both the peculiar and constant phenomena or symptoms, and the accidental ones separately; of which latter kind are those which differ occasionally by reason of the age and constitution of the patients, and the different methods of cure. Lastly, the seasons of the year that principally promote any particular kind of diseases are to be carefully marked. It is to be owned that some diseases happen indiscriminately at any time; whilst many others, by a secret tendency of nature, follow the seasons of the year with as much certainty as some birds and plants.”

So much for the study of disease. “But a physician may likewise collect the indications of cure from the smallest circumstances of the distemper as certainly as he does the distinguishing signs from them. By these steps and helps the Father of Physic, the never-enough-extolled Hippocrates, came to excel in his profession.” If any one were to ask whether, besides the two foregoing desiderata in physic—namely, a true history of disease, and a certain and established method of cure—a third should not be added—namely, a discovery of specific remedies—he answers in the affirmative, and promises to do his part towards the effort; “for though the best art in curing diseases consists in assisting nature to cure by evacuation, it is nevertheless to be wished that the cure might be shortened by means of specifics (if any such medicines can be discovered), and, which is of more importance, that the patient may be preserved from the evils which are the consequence of those errors that Nature often unwillingly makes in expelling the cause,

even though she be assisted in the most effectual and skilled manner by the physician."

The above remarks of the master apply only to the treatment of acute diseases; when chronic diseases are being considered, another element comes in. Nature then is not possessed of so effectual a method of expelling the morbid matter. In eradicating a chronic disease, therefore, whoever is possessed of a medicine powerful enough to destroy the species of it justly deserves the appellation of physician.

Specific Remedies.

Regarding specifics, Sydenham held that there was one alone—namely, the Peruvian bark. "For there is," he argues, "a wide difference between medicines that *specifically* answer some certain curative indications and those that specifically and immediately cure a disease without regarding any particular intention or curative indication." To exemplify this, he says that "mercury and sarsaparilla are usually reckoned specifics in the venereal disease, though they ought not to be deemed proper and immediate specifics unless it could be demonstrated by undeniable instances that *mercury* had cured the patient without causing a *salivation*, and sarsaparilla without causing a *sweat*. For other diseases are cured in the same way by other evacuations, and nevertheless the medicines exhibited for this purpose do no more immediately contribute to the cure of the diseases that yield to those evacuations than a lancet does to the cure of a pleurisy, which nobody will call a specific in that particular disorder."

It is remarkable how little we have progressed in our work at specifics since the day when Sydenham wrote the passages here cited. To his one specific—Peruvian bark—we have added potassium iodide, and possibly sodium salicylate. There we stand, and little better. It is clear that Sydenham had gauged the matter of cure by common remedies and specific remedies with shrewd intelligence, and the test he put is singularly happy. Does mercury cure venereal disease by a specific virtue of its own as mercury, or by its eliminating effect as a producer of salivation, an eliminator? We could not answer that question even now. If it cures by salivation, as an eliminator, it is a common evacuant; if it will cure less salivation, it is a specific. Who knows the secret?

Vegetable Remedies.

As a prescriber Sydenham inclined to remedies derived from the vegetable kingdom. "It is indeed a pity," he writes, "that we are

no better acquainted with the virtues of plants, which I esteem the best part of the materia medica, and most likely to afford such medicines as we have just treated of. For the parts of animals should seem to resemble the human body too nearly, and minerals to differ too much from it; and hence it is, I ingenuously own, that minerals more effectually answer indications than medicines prepared from animals or plants do, but yet not specifically, in the sense and manner above mentioned." It is worth our thought whether this master may not be correct in this particular. Parts of animals are dead: they have passed through their vital services; parts of minerals are dead: they have not entered into the realms of life. How can either be specific remedies? Parts of plants are in the domain of life, but have reached only the stage when from them the animal structures can be formed and the animal powers vitalised. They are in the condition for specific purposes, and if we knew how to use them would indeed probably yield us the virtues we require for specific treatments.

It must be borne in mind that the preface referred to above is written as preliminary to the author's method. I have tried to put into a nutshell the foundations of his method and practice. Those foundations were laid soundly as far as they went, and were described honestly and boldly, but it is certain they were not popular in the ranks of the profession. They were in advance, and nothing is so unpopular and unpropitious to a man as advancement in independent form. He is a fool and blind to the evidence of history who, whatever his genius, foresight, or industry may be, expects to keep on cordial terms with his cotemporaries when he is everlastingly running ahead of them and bringing back new observations. It is not in human nature they should like him; it is in human nature, first and foremost, that they should treat him as a kind of deserter so self-willed and independent, there is no dealing with him. Sydenham knew and felt all this; and dropped naturally the proud lamentation that, "sensible of exposing all the fruit of his labours for the best part of his life to the intolerant and ignorant, expecting from the disposition of his degenerate age nothing but censure and contumely in return, and knowing he could have gained more reputation by advancing some trifling and useless speculation, he hopes still *to be rewarded elsewhere*." Sydenham has been rewarded elsewhere. He has been rewarded by the posterity into which he cast himself. He wrote these sayings in prophecy with a full heart. They were puritan sobs, but they had better not have been expressed.

What did it signify to Sydenham that the "ignorant and intolerant" of his time subjected him to censure and contumely? He merely flattered their ignorance and intolerance by showing them he felt it. He had better have passed them by like low brawlers at the corners of the king's highway, and, heeding them not, pursued his own course to the gates of paradise.

In his conclusion, Sydenham observes that he knows men as well versed as himself differ from him, but it is not his business to inquire what other persons think: it is his business to establish the truth of his own observations, in doing which he prays for the patience of his readers, not their favour. He renounces "the pompous part of prescription," and follows Hippocrates in simplicity. Let us take him at his word.

Diseases, Acute and Chronic.

In the opinion of Sydenham, a disease, however prejudicial its causes may be to the body, is no more than a vigorous effort of Nature to throw off the morbid matter, and thus lead to the recovery of the sick. The causes of acute disease, according to him, are twofold. In one kind particles of the air which disagree with the "juices" of the body insinuate themselves into the lungs and permeate the body, mixing with the blood; in the other kind some fermentative changes take place in the body, with putrefaction processes, and thereupon the body, being unable to eliminate the poison, becomes deranged or ill, and Nature therefore provides such a method or train of symptoms as may expel the peccant matter, that would otherwise destroy the human fabric. By this Nature sometimes effects a cure when left to herself; yet not always, for sometimes too, either by endeavouring too much or not enough, the patient pays the debt of mortality: "*for it is an immutable law, that no generated being can always continue.*" In these views Sydenham really expresses what we teach now. His diseases from bad air are our diseases from the same cause; his fermentative diseases are our zymotics; his diseases from products of fermentation and putrefaction are our auto-toxæmias and blood poisonings. That which he missed in his system or method was the influence of vibrations and the nervous reflexes. Hartley had not lived as yet, and Sydenham had no such originality or training as would lead him to understand the power of the mechanical forces of the universe on the human organism.

The division of disease into acute and chronic forms depends, after

the views advanced by Sydenham, if I understand him correctly, on the fact of the presence or absence of fever. That which is acute is febrile. If the body be urged by natural forces into excitement and fever in order rapidly to destroy or remove poisonous material, *materies morbi* that would kill if they remained even for a short time in the body, then the disease is an acute disease. But if the cause at work to produce disturbance be so inactive as not to light up excitement, if it become, as it were, adapted to the body, making it ill without immediately destroying it, then the disease is a chronic disease, and requires treatment as distinctly applicable to its condition as the acute affection does in its way. Wallis attempted to simplify this reading of Sydenham by generalising upon it, but I do not feel that he succeeded, while he certainly lost in refinement and precision. In chronic disease, says Sydenham, the cause of the disease is fixed in the particular part, and cannot raise the assistance of a fever or of febrile heat to expel it, so it remains there. Thus in palsy the morbid matter is fixed in the nerves, and the bodily forces are not efficient for conveying it off. Change terms a little, and the theory holds. After sciatica *sans* fever, why is there often the numbness and partial paralysis of limb? What better theory than that, in the course of the imperfect nutrition of the affected nerve, some change of structure takes place in it, or some new substance is deposited in it, which afterwards interferes with function, as if the nervous trunk had been physically injured? In acute diseases the change leading to chronic effects may be peremptorily checked by the very acuteness of the attack, a natural explanation of what we call *crisis*. The cause removed, recovery sets in.

Epidemic Diseases and Epidemic Influence.

I am not quite sure whether the view put forth by Sydenham in regard to epidemic diseases and epidemic influence was or was not entirely original. He is generally credited with real originality of thought on the matter, but in truth Willis and other of his contemporaries expressed, in their way, similar doctrine, and I feel candidly that in what he says he is rather expressing the advanced thought of his day than anything particularly and from the first his own. At the same time it is well to know precisely what he did say; and this is it. He said that "some acute diseases proceed from a latent and inexplicable alteration of the air, infecting the bodies of men; and not from any peculiar state or disposition of blood and

juices, any further than an occult influence of the air may communicate this to the body ; the derangements continue only during this one secret state or constitution of the air, and raging at no other time, are called *epidemic distempers*."

In these words the whole of the Sydenham idea of the originating cause of epidemics is generally embodied. When he descends to particulars he gives us fresh notions as to cause. "There are various constitutions of years that owe their origin neither to heat nor cold, dryness nor moisture, *but rather depend upon a certain secret and inexplicable alteration in the bowels of the earth*, where the air becomes impregnated with such kinds of *effluvia* as subject the human body to particular distempers so long as that kind of constitution prevails, which, after a certain course of years, declines, and gives way to another. Each of these general constitutions is attended with its own and peculiar kind of fever, which never appears in any others ; and therefore," says he, "I call this kind of fever stationary."

In every year, however, other fevers arise, which proceed from some one or other manifest quality of the air : for instance, pleurisies, quinsies, and the like generally happen when an intense and long-continued cold is immediately succeeded by a sudden heat. These diseases he calls the "*intercurrent*," as distinguished from the "*stationary*." The sensible qualities of the air have thus some share in producing these intercurrent fevers, which appear in every constitution of the atmosphere. They do not cause the epidemics peculiar to the constitution, yet they may more or less dispose the body to the particular epidemic disease.

"Some epidemics in some years are uniformly and constantly the same, appearing in almost every patient with the same train of symptoms, and going off in the same manner. From this kind, therefore, as the most perfect, the general history of epidemic diseases is to be taken." On the contrary, in other years other distempers prove irregular and dissimilar, as having no one fixed form ; and there is another subtilty of nature still behind—viz., that the same disease, in the very same constitution of the year, frequently appears in a various and dissimilar manner as to the time of its beginning, state, and declension. Again, all epidemics are of two sorts, vernal and autumnal. Measles and the vernal tertians begin before the vernal equinox, commencing in January and disappearing about the summer solstice ; whilst others, like the plague and small-pox, rising in the spring and daily increasing, come not to their state till about the autumnal equinox, after which they gradually decrease, and vanish at

the approach of winter. "*Cholera morbus* rises in August, and finishes its course in a month ; but dysentery, rising at the same time as autumnal tertians and quartans, runs on to the winter."

It must be carefully remarked that, as many of the diseases named appear in the same year, some one or other of them rules over the rest, which rage less at the same time ; so that, this one increasing, the others decrease, and, this diminishing, the others soon reappear ; and thus they prevail by turns, according as each is favoured by the disposition of the year and the sensible qualities of the air. But all epidemics of one constitution are produced by one common general cause ; and all epidemic distempers, especially fevers, "*depend upon the secret constitution of the air.*"

These general principles are illustrated by an account of the epidemic constitution of the years 1661-4 in London. The description of the symptoms and history of the whole series of diseases furnishes a narrative of the first order, even as a piece of human history. I must refer the student to the work itself for details, and when he is engaged in tasting from the original spring, I am sure he will not regret my inability to find room for what at best could be but an imperfect epitome.

I pass over sundry other essays and epistles—*A Treatise of the Gout and Dropsy*, the *Schedula Monitoria*, an essay "on the rise of a new fever," a treatise on "the small-pox," a treatise on "the history and treatment of the venereal disease," and a dissertation on "bloody urine"—in order to arrive at what he called the *Processus Integri*, or complete methods of curing most diseases, to which he added an accurate description of their several symptoms, many judicious observations, and a short treatise "of a consumption." This last work, *Processus Integri*, was drawn up by Sydenham for the use of his son, and was edited by "S. M." after his death. The *Processus* is, in fact, a compendium of Sydenham ; it gives his diagnosis, his prognosis, and his therapeutics, all in a short and practical form. It begins with a list of the prescriptions commonly used by Sydenham, and it continues with the account of the special remedies and regimens which he was in the habit of employing. By a perusal of this work we get an insight into the practice of the man at the bedside. We learn that his predilection was all for plant remedies ; we see that, whilst he handled some potent remedies well, he was deceived constantly as to other remedies in which he had faith ; and we gather that his regimen was often far ahead of his physic. Some of the remedies sound to our modern ears singular. The

distilled water of holy thistle, the distilled water of black cherries and milk, the conserve of red roses, garden scurvy grass and sage, syrup of buckthorn—these, and many other substances equally simple, are introduced as if their curative value were unimpeachable. I notice, however, at the same time, that he often mixed with these simples other potent drugs—antimony, opium, rhubarb, and iron; but he held that it was not safe to give antimonial wine, even in the smallest dose, to children under fourteen. In nearly all diseases he drew blood, and in intermittent fevers he had learned to trust to bark; but in the “stationary fever of 1685-90 he recommended repeated bleedings with purgation” till the patient recovered. For scarlet fever, which he differentiated from measles, he prescribed burnt hartshorn in powder—not a bad remedy; for pleurisy, bleeding to ten ounces, followed by pectoral remedies; for acute rheumatism, bleeding, followed by syrup of lemons and violets mixed with distilled waters, which may be “drank at pleasure”; for erysipelas, bleeding and purging; for “stubborn itch,” the same; for small-pox, the same, with purging and with opiates, which are always to be used in this disease; for St. Vitus’ dance, again, bleeding and purging; for apoplexy, immediate bleeding; for the cholera morbus, opium; for profuse menstruation, bleeding and purging; for vomiting and spitting of blood, the same.

Sydenham was quite aware of the difference between a gonorrhœa virulenta, or “venereal running,” and the venereal disease; but he considered the distinctive venereal disease only arose “when the blood is tainted by the long continuance of a gonorrhœa, or the ill-advised use of astringents when the true pox appears, attended with buboes in the groin.” The error extended down to the time of John Hunter, and was not even detected by him. Sydenham did not detect it, but he knew all the symptoms of venereal disease in every stage, to the stage “when the nose falls flat, the ulcers, caries and pains increase every day, the limbs rot away piecemeal, and the mangled carcass, being at length grown hateful to the living, is buried in the earth.”

Sydenham’s treatment of venereal disease was mercury by inunction up to quick salivation, the salivation being so regulated “that the patient may spit about two quarts in twenty-four hours.” Afterwards, to prevent a relapse, “the patient took a scruple of sweet mercury once a week for a month or six weeks, though he appeared to be perfectly well, and able to go abroad.”

For chlorosis Sydenham administered iron with wine and roots

2^o

13th (I leave) to give order what she may not
 be obliged to any yet, but let it be
 and which what ever is goodfull to
 her as at other times

I should be very glad if it might be that
 your child's fitt in regard of it, tenderness of age
 would go away of its own accord, so which pre-
 pose were it my own I think I should
 put the cure upon giving it now and then
 a spoonfull of sack morning five a clock
 in the afternoon and at night, but in case
 upon tryall the fitts shall grow still worse
 so as to endanger her (for the avoiding of
 which pray let her not be confined to the
 bed or chamber) then I should ~~proceed~~
 the Burke after this manner R. corticus
 Ruv. subtilis. pulv. ʒij syr. do rosat
 of. s. f. elect in xij partes ag. di'vidone
 captanum antia vel quarta quaz horaz
 solutam in cohl. i. Julap. seq. sup lib. ʒij
 cohl. ii. R. ʒij. corator. miz. ʒvj wannam
 ʒvj. syrup. laryoph. ʒij. M. you know
 that the first dose is to be taken just at
 the going off of the fitt of this with my
 humble service to yr Lady is all at present
 from
 ʒv y^r humble & oblig'd
 The Sydenham



of angelica. This was accompanied by purges. Here we almost follow Sydenham at the present day. Gout, from which he himself was a great sufferer, was, he thought, best treated by a simple and very temperate regimen, in which he is very sound. He did not approve of bleeding and purging for this affection. In the early stages of true consumption of the lungs he bled moderately to allay acute symptoms; but, he says, "the principal assistant in the cure of this disease is riding on horseback daily"; nor need the patient be tied down to any particular rule of diet, "as the cure depends wholly upon exercise." Lately we have returned to the Sydenham cure for consumption, and our modern practice confirms his. Horse exercise was a great remedy with Sydenham.

Apart from what is described by him in the *Processus*, there are endless other teachings of Sydenham which, when perused, awake attention. Some would, however, be thought objectionable—the following especially so, although he prides himself upon it. In cases of great exhaustion, when other means have failed him, he has made use of "a singular expedient with great success—namely, the application of the heat of strong and healthy young men. I have never found," he continues, "the repeated application of warm napkins to prove near so serviceable as the present method, where the heat applied is not only more natural to the human body, but also more mild, moist, equable, and constant. Nor do I think it below me to have mentioned this expedient, whatever censure it may expose me to from such as condemn whatever is vulgar, since the health and benefit of mankind ought to be preferred to their false opinions of things."

Some idea of the mode of prescription by Sydenham is supplied by the annexed unique letter, which, through the kindness of my learned brother Dr. Munk, I am able to publish for the first time in facsimile. It was a letter evidently preserved by his son William Sydenham, since it is docketed at the back, *Letter belonging to my Father*. The letter-paper is good, stout, well-made stuff, with an inch and a quarter margin on the left-hand side.

Enough has now been said to illustrate the views of Sydenham in regard to therapeutics. He lived before the time when the iatro-mathematicians flourished, and was therefore untouched by the mechanical philosophy. He lived at a time when the chemical ideas of Paracelsus were losing their hold. He practised, therefore, rather an empirical doctrine based on simple observation; yet he also held by a zymotic theory like that we now accept. Fevers he

held to be of fermentative origin, the symptoms of them arising from one of two causes—the excitement of the fermentation, or the influence of products of false fermentation acting as poisonous products. Once more we have brought before us a line of thought which in this day has been revived and passed for new.

To Sydenham has generally been accredited the introduction of Jesuits' Bark (*Cinchona*) into England as a cure for agues. In this there is some error. Sydenham played a considerable part in the introduction, and to his judgment, liberality and learning we are, perhaps, most of all indebted. But the historian must be just, and although he may not like the character of the man, he is bound to give to Sir Robert Talbor the credit of first using, successfully and confidently, Peruvian bark for the cure of agues. Him, Sydenham followed. Talbor was in full swing of practice, with bark as his sheet-anchor, in 1666, while Sydenham yet tried it and doubted. Afterwards, without any of the secrecy of his cotemporary, he became more confident; and, finally, he became the one authority whom all relied on.

Again, Sydenham has been credited as the author of the "cooling method of treatment in small-pox." Here also a rival has been found in Dr. John Crane, who in a preceding generation instituted the plan. The claim is fairly founded, but it is due to say that, about 1682, the honour of placing the "cooling regimen" distinctly before the world belongs to Sydenham.

IN EPITOME.

A book has yet to be written on Sydenham. The friend of Locke and Boyle, he ranks in some measure with them. His latinity has been questioned, and Dr. Mapletoft and Mr. Gilbert Havers of Cambridge have been named as translators of his works from English into Latin. I know not how far this may be true; it is not unreasonable, and it is of little moment.

I should not, for my part, call Sydenham the inventor of any new system in medicine. He merely, in the midst of much controversy, held the old ground, stood by the father and fathers of physic—a medical puritan in scientific as well as political faith.

The last years of Sydenham were marred by physical pain. He began early in life to suffer from gout. In his fifty-second year—in 1675-6—he was affected severely by it, and he never ceased to be

actually free from it from that time onward. Later his symptoms of gout became complicated with those of stone in the bladder and hæmaturia. In these his later days he lived through a martyrdom; but, says Wallis, "he never betrayed any indecent impatience or unmanly dejection under his torments, and in every interval of ease he applied himself to the assistance of others with his usual assiduity. So well did he bear up that on May 17th, 1676, he proceeded Doctor of Medicine as a member of Pembroke College, Cambridge; and although he must have been wealthy, he continued in practice so long as he could be useful. On December 29th, 1689, at the age of sixty-five years, he died in his house in Pall Mall, and was buried in St. James's Church, where a tablet, erected by the College of Physicians in 1810, records in elegant Latin some of his many virtues—*lubentissimè*."

Erasmus Darwin, M.D., F.R.S., and Darwinian Medicine

IN the early part of the fifties, there lived at the fine old mansion called Hartwell House, near to Aylesbury, a singular and learned man named Dr. John Lee. He was a Doctor of Laws, not of Physic, and he was also a man of wide and varied science. He took a leading part in meteorological science, then in its infancy; he was a student of Egyptology, and he was the President of the Royal Astronomical Society. His wealth enabled him to play the host to science and scientific men; and once a year, when bright summer reigned, and the park and mansion and grounds at Hartwell were most attractive, the excellent master of them would invite down to them twenty or thirty men engaged in scientific pursuits to spend not a day, but a fortnight, in the midst of good fellowship and congenial delights. I was so fortunate as to be more than once included in this charming circle, and many of my choicest after-friendships were made there. In the evening it was the custom for us to meet in the drawing-rooms and to discuss in a semi-formal manner some learned topic, ancient or current. One evening the subject brought before us was Darwinism. The opener was the well-known and much-respected Rev. J. B. Reade, F.R.S., Vicar of Stone, a kind of modern Hales, whose love for all science was boundless, and who was as well read in the past of science as in the present. To me the term Darwinism was new; but I soon picked up the fact that it referred to the theoretical teaching of the great Erasmus Darwin, one of the lights of the last century. In our debate this name became incidentally blended with that of Charles Darwin, now so entirely connected with the word Darwinism. One of our party was the late Admiral Fitzroy, the distinguished meteorologist, who, as captain of the *Beagle*, had an intimate acquaintance with, and

claim to the close friendship of, the later far-famed Charles Darwin, the grandson of Erasmus. "I think," said the Admiral, "the elder Darwin will find a rival in his grandson, and that Darwinism, through Charles Darwin, may take a new and more enduring lease in the future." I made a note of the term and of the prediction relating to it.

Several years after that event I went to Leamington to deliver a lecture at the Philosophical Society of that town. I was invited to dine in the evening, after the delivery of the lecture, with one of the brightest and most genial representatives of physic I ever knew: the late Dr. Thomson. I was placed at table between Dr. Johnson, of Birmingham, and a lady whose name at the moment I was not conversant with. During the conversation that ensued, a portion of my lecture, referring to the famous Dr. Joseph Priestley, came under discussion. I observed that I had the pleasure of knowing personally Mrs. Joseph Parkes, the grandchild of Priestley, and that from her I had heard an account of the famous Lunar Club, which met on nights when the moon was in its fulness, and of which the great names of Priestley, Watt, Boulton, and Erasmus Darwin appeared as the leading members. A smile of surprise passed between Dr. Johnson and my lady companion at this observation, as the former said, "If you would like to know more about the Lunar Club, Miss Galton, who sits by your side, will tell you much, for she is the grandchild of Erasmus Darwin, and lives in this place with her mother, his daughter." As a matter of course, my inquiries went on more eagerly; and, to my great satisfaction, I received an invitation to breakfast next morning with the daughter of Darwin and Darwinism.

I found this daughter, Mrs. Galton, an aged lady, but full of vivacity and intelligence. Although breakfast was served early in order to allow me time to return to London by a morning train, Mrs. Galton was down ready to receive me, and was busy knitting. She met me with the most cheerful kindness, and during our repast related the particulars of one of the Lunar meetings at her father's house near Derby. The guests began to arrive about four o'clock in the afternoon; and she, who was for the day the young lady in charge of the household, received them. Priestley and Watt drove in, in a gig, from Birmingham; and others followed. Her father was in his garden, of which he was very proud, and in which he was always delighted to be. He carried a rose in his hand, and descanted on its beauty and the special characters of it, to the

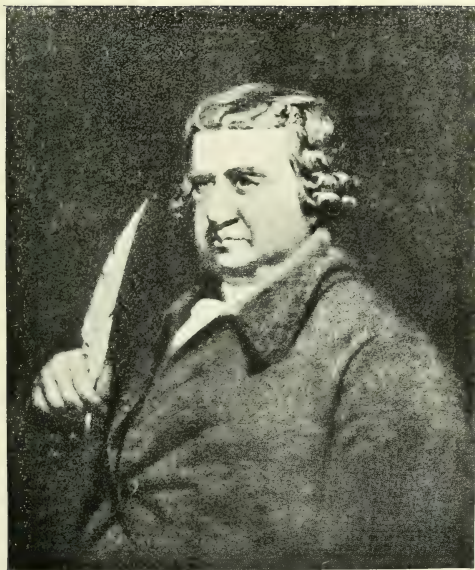
delight of his friends. After a short interval she made tea, to which all sat down, and during which friendly greetings and gossip, with many a timely joke, passed freely. Then the young maiden—she was nineteen at this time—was left alone whilst the philosophers retired into the library, or sanctum, to discuss the scientific problem that lay before them for consideration or solution. The discussion over, the final event of the evening was the supper previous to the departure of the guests on their homeward journey, sometimes a distance of thirty to forty miles. But what mattered the distance to them under the light of the full moon? On the night in question Priestley and Watt once more occupied the gig, and started with an amusing disputation as to which of the two should take the reins, a dispute settled by the host in favour of the inventor of the iron horse.

If imagination might be let loose, one could well indulge it in speculation on the discourse entered into between Joseph Priestley and James Watt during their long ride. The subject they had been considering under the roof of Erasmus Darwin had been colour, and that they would have enough to debate upon in regard to it is not difficult to imagine. I will make no venture, but proceed to the illustrious subject of this biography, doing the best I can to read the man, and out of an immense pile of beautifully readable material, lying to left and right of me, extract the vital part as food for vital philosophy.

DETAILS OF LIFE.

I have not far to go for accurate details of the life history of Erasmus Darwin, for the place where I have to go is as sound as can be wished. In 1870 it was rumoured—I scarcely know from what source, some gossip of a literary friend of mine I believe—that I was preparing a life of the elder Darwin. The late Mr. Charles Darwin wrote me a note asking if it were the fact, offering me assistance if it were, and at the same time forwarding to me a recent volume on the *Scientific Works of Erasmus Darwin*, by Ernst Krause, translated from the German by W. S. Dallas, and with a Preliminary Notice by Charles Darwin himself. From this work I shall freely extract portions of the biographical facts required before turning to the works of the man himself as lessons for these pages.

Erasmus Darwin was born on December 12th, 1731, at Elston Hall, Notts. He was the fourth son of Robert Darwin, Esq., a member of a good old English family—and possessor of a taste for



Dr Darwin

From a portrait (from *Life of Erasmus Darwin*, by Charles Darwin) after
a picture by J. Wright, A.R.A., of Derby.



scientific pursuits, a man also of stern temperance principles in respect to the use of alcoholic beverages. The father was bred for the Bar, but after he had married—and he seems to have espoused a learned lady—he gave up his profession, and retiring to Elston Hall, remained there to the end of his days. The brothers of Erasmus—whose Christian name, by the way, came from Erasmus Earle, Sergeant-at-law, whose daughter an earlier Darwin had married—would appear to have been fond of outdoor sports and exercises; but Erasmus Darwin had no such tastes. He was given to poetry and to the practical study of mechanics. He made an alarum for his watch, and invented an electrical machine of a rude kind, with which he would show little experiments. “He had always,” his eldest brother informs us in a letter written to his nephew Robert, “a dislike to much exercise and rural diversions; and it was with great difficulty that we could ever persuade him to accompany us.” At ten years old (1741) he went to Chesterfield School, and remained there nine years. At the age of sixteen, writing from school, which was apparently very comfortable for him, to his sister Susanna respecting the keeping of Lent, he shows himself off strongly in the matter of his temperance regimen: “I fancy you forgot in yours to inform me y^t your Cheek was quite settled by your Temperance; but, however, I can easily suppose it. For y^e temperate enjoy an ever-blooming health, free from all y^e Infections and disorders luxurious mortals are subject to. The whimsical Tribe of Phisitians, cheated of their fees, may sit down in penury and Want; they may curse mankind, and imprecate the Gods, and call down the parent of all Diseases, luxury, to infest Mankind, luxury more destructive than the Sharpest Famine; though all the Distempers that ever Satan inflicted upon Job hover over y^e intemperate, they would play harmless round our Heads, nor dare touch a single Hair. We should not meet those rare thin and haggard countenances which every day present themselves to us. No doubt men would still live their Hunderd, and Methusalem would lose his Character. Fever banished from our Streets, limping Gout would fly y^e land, and Sedentary Stone would vanish into oblivion, and Death himself be slain.” The writer adds that he could “for ever rail against luxury and panegyrisse upon abstinence,” but excusing himself, writes a few more lines which are not legible, and prays “hast, supper being called, and he very hungry.”

In 1750, in company with his two elder brothers, he went to St. John's, Cambridge, where the means of the brothers were so

small, they were obliged to mend their own clothes. Erasmus won the Exeter Scholarship, worth £16 per annum. In 1754 he took Bachelor of Arts at the head of the Junior Optimes, and he began the study of medicine, courting at the same time the Muses. Proceeding to London, he attended a term of lectures at the school of William Hunter; thence, in the autumn of 1754, he moved to Edinburgh, where he studied patiently, and under such strict economy that from July 13th to October 13th his board cost him £6 12s. In Edinburgh at this time the school of Boerhaave was dominant, a school of medicine as dogmatically chemical and humoral as the narrow school of the present hour. Then, as now, the external influences of nature, or rather the influences of external nature on the human body, were ignored in the schools; and the nervous system was looked over as if it existed without uses. Darwin, young as he was, had sense enough to be sceptical, and setting the narrow hypotheses at their true value, became in his more matured life a leader in the broader view which accepted the influence of external vibrations, acting through the senses, as the most potent of all forces governing the organism in its current course, and storing up energy for future application and demonstration of that power which, for want of a better word, we call vital. In 1754 his father, whom he describes as "frugal, but not covetous," a man tender to his children, but who kept them at an awful distance, died, and next year he returned to Cambridge to take his degree as Bachelor of Medicine. Afterwards he went back to Edinburgh for further study; and, his studies complete, he settled himself down in Nottingham to medical practice. Practice did not come, and so, after waiting for two or three months, he moved to Lichfield. He was not idle at Nottingham, although practice failed him, for whilst there he wrote letters in English and in Latin to young Reimar, son of a famous German philosopher, to whom also he dedicated a poem. He corresponded with Gurney on the subject of shorthand, acquiring that useful art for himself and turning it to practical account; and he got into a little difficulty about writing an anonymous letter to a surgeon who, as he fancied, had taken a fee for performing an operation on a poor man who was unable to pay the sum demanded. Two-thirds of the fee were returned, and Darwin himself made up the rest; but the first part of the act was quixotic and not so discreet as it might have been, an enthusiasm of youth which was afterwards regretted.

It was in the November of 1756 that Erasmus Darwin opened his career in the city of Lichfield; and in that city he remained

for over twenty years. In Lichfield practice came ; and from there his name began to extend abroad, carrying with it the fame of industry, of original power, and of advanced scholarship, both in medicine and science. A little more than a year after settling in his new sphere he married a charming young lady, in her eighteenth year, Miss Mary Howard, with whom he lived in perfect conjugal happiness up to her death in the year 1770, and by whom he had three children : Charles, born September 3rd, 1756 ; Erasmus, born in 1759 ; and Robert Waring, father of the Charles Darwin of our time, born in 1766.

The professional profits of Darwin rose in seventeen years from £18 7s. 6d. to £1625 3s. Eighteen years later still he calculated, for the income tax return, that he was making £1000 a year, from which he deducted £200 for a liveried servant, four horses, and a day labourer, and £200 for travelling expenses and chaise hire. He remained a widower for eleven years after the death of his first wife, and then married the widow of Colonel Chandos Pole, a marriage of ardent and continued affection. Soon after this second marriage, in 1781, he moved to Radburn Hall, and two years later to Derby, where his prestige was maintained up to the last. Lichfield and Derby therefore may alike claim him as their most celebrated Æsculapian.

THE WORKS OF ERASMUS DARWIN.

Erasmus Darwin has been considered a prolific writer, but it is worthy of note that his authorship of any importance commenced when he was advanced in life. His poem, *The Loves of the Plants*, was not prepared for press until 1788 ; his other works were continued to 1800, two years before his death, and one was posthumous. Four particular treatises comprise these works : a first entitled *The Botanic Garden*, including a poem on *The Loves of the Plants* (1788) ; a second, *The Zoonamia ; or The Laws of Organic Life* (1794) ; a third, *Phytologia ; or The Philosophy of Agriculture and Gardening* (1800) ; and a fourth, *The Temple of Nature*, a poem, posthumous. In addition there should be noted a short treatise entitled *A Plan for the Conduct of Female Education in Boarding-schools* (1797).

The works themselves are not numerous, but they are, with the exception of the last, large in themselves as books, and still larger and more comprehensive as philosophies. They exhibit their author

in so many capacities, in so many qualities, he appears as a body of many men rather than as one. He is a poet, a natural philosopher, a physician, an agriculturist, a philanthropist, a scholar, and withal—for this must not be omitted—a man of the world. I shall prefer, in treating of his works, to consider them as springing from these different sources in the same individual rather than notice the different works one after another. This will be a readier method of understanding the author, because his labours, although, by accident or by circumstance divided into books, are really indivisible as teachings. They all refer to some few choice subjects that were on his mind, and certain of them were clearly conceived and ready for publication before others were actually published. *The Zoonamia*, for example, was ready, or nearly so, for the press in 1775, and was intended to be posthumous. It was published about twenty years later, after *The Botanic Garden*, which probably was not commenced when *The Zoonamia* was completed.

The Poet.

From his earliest days Darwin considered himself a poet, although he published nothing important of the poetic kind until late in life. He devoted himself for twenty or more years, so he has related, to the practice of his profession; and in sending a poem of little pretence to a friend, affirmed that he would not again tempt the Muses. He did not keep his word in this respect, as we now know. Buying about eight acres of land near to Lichfield, he made a botanic garden there, and that seemed to inspire him with the idea of the poem which has placed him high up on the roll of medical poets. Amongst the poets of physic he holds a leading place. He does not approach Virgil, if Virgil may be claimed as belonging to us; he would scarcely rank with Akenside; he would not rank with Goldsmith or Keats; but he is far above Blackmore, with whom he is sometimes placed, and is perhaps more than equal to Armstrong, who in mode is much the same. Immediately after the appearance of *The Botanic Garden* his poetry was much esteemed, and, by some competent judges, was thought to be fine and even immortal. Tastes after a while changed. The poem called *The Loves of the Plants* was parodied under the title *The Loves of the Triangles*, and in course of time the whole of the poetry was stigmatised as heavy, cumbersome, mechanical, and, with the exception of a few passages, as mere lines strung together in meaningless order—didactic art in chains. The true view to take on the matter is to consider Darwin

truly as a didactic teacher, writing poetry, without spontaneity, for didactic purposes. This was his error. When he was teaching in prose, he was effective, natural, perspicuous; when he passed to poetry, he became so involved in imagery, so obscure, so spell-bound, he was obliged to add the most copious notes in prose, in order to explain to his readers what he had been driving at in poetry. Perchance a good many poets had done well by following the same method, but these would not be poets of the highest class. Poets of the highest class make their song tell its own story, and, whether they appeal to the head or the heart, let every effort carry its own and perfect meaning. It has been urged, as if in excuse for Darwin, that he was surpassed by Wordsworth and the later school of poets because they appealed to the emotions instead of the intellect, and that from them poetry has taken a new lease of life, a life altogether apart from the poetic lectures which Darwin delivered. This is like saying that didactic poetry was doomed and went out with Darwin. The hypothesis cannot be admitted for a moment. Burns was a teacher: his *Cotter's Saturday Night* in a simpler sphere is as didactic as Darwin's account of the universe. No, that was not the fault of Darwin. His failure, in so far as his poetry was a failure, lay in three directions. He tried to expound by poetry subjects so majestic, so near to the ways and works of God Himself, that the grandest poetic genius who ever lived could not have winged his way to a perfect record by poetic art. He was daring heights which Dante himself could not have scaled. Next, in what he did he was not spontaneous, or was spontaneous at moments very short and light. Lastly, he chose the most inflexible, cumbrous, and dismal form of verse, verse that did not suit his own genius, verse that did not differ from the everlasting grind of a saw, that had to be persistently reset, in order that it might make its way with ease and possibility. In reading his poems one can almost see the author at his labours, wearying, falling off tired, returning, reworking, and feeling at last that the student must have the aid of a crib in prose ere ever he can understand the nature of the description. We turn to Canto I., *The Economy of Vegetation*, and drop at once on a few lines demonstrative of the peculiarities named above. The Goddess of Botany addresses the Nymphs of Fire:—

"Nymphs! you disjoin, unite, condense, expand,
And give new wonders to the chemist's hand;
On tepid clouds of rising steam aspire,
Or fix in sulphur all its solid fire;

With boundless spring elastic airs unfold,
 Or fill the fine vacuities of gold ;
 With sudden flash vitrescent sparks reveal
 By fierce collision with the flint and steel,
 Or mark with shining letters Kunkel's name
 In the pale phosphor's self-consuming flame.
 So the chaste heart of some enchanted maid
 Shines with insidious light, by love betrayed ;
 Round her pale bosom plays the young desire,
 And slow she wastes by self-consuming fire."

To the common reader this poetic description is meaningless ; in order, therefore, to make it plain, between four and five hundred words, in prose, are added as footnotes, with an additional note to explain that Kunkel was one of the discoverers of phosphorus. The notes themselves are most instructive quite apart and away from the poem, and only serve to kill all the romance about the chaste heart of the enchanted maid who comes upon us with such dazzling surprise and disappears in so awful a consummation.

It is not always, however, that the author of *The Botanic Garden* surfeits his readers with lumbering verse, or puzzles them with poetic philosophies requiring prose notes for their elucidation. When he becomes poetical, in the true sense of the term, he gives, as Charles Darwin says he did in some love pieces to his second wife, bits of real beauty. Here, for instance, is a little song to May, which, being free of philosophy and full of sweetness, rings out like music from previous noise :—

" Born in yon blaze of orient sky,
 Sweet May ! thy radiant form unfold,
 Unclose thy blue voluptuous eye,
 And wave thy shadowy locks of gold.

" For thee the fragrant zephyrs blow,
 For thee descends the sunny shower ;
 The rills in softer murmurs flow,
 And brighter blossoms gem the bower.

" Light Graces, dressed in flowery wreaths,
 And tiptoe Joys their hands combine ;
 And Love his sweet contagion breathes,
 And laughing dances round thy shrine.

" Warm with new life, the glittering throngs
 On quivering fin and rustling wing,
 Delighted, join their votive songs,
 And hail thee, goddess of the spring."

The two specimens of Darwinian poetry rendered above must suffice here, but they are poor representations of *The Botanic Garden*. *The Botanic Garden* lives, and will ever live, on its notes—notes not of musical song, but of scientific prose. It would be difficult to find in any author so much experimental description, so much originality of thought, as may be found in the explanatory note passages, where classical joins with modern learning, and the future is anticipated with such foresight that the mind of the present day is positively startled as it receives the early impulses of what is now pure matter of fact and common realisation.

The Naturalist.

The natural philosophy of Darwin is included in the didactic work *The Botanic Garden*, and it will be observed that, whereas he wrote *The Zoonamia* first, he published it after the appearance of *The Garden*. We may infer pretty clearly from this that he desired to ensure the publication of his most ambitious claim to immortality whilst his mortal powers were in their hale, if not their pristine, vigour. He had thought long over the propositions he wished to announce; and so startling were they, he veiled them in a kind of poetical allegory, as if it were pardonable in a poet to say what he liked, even on matters of solid philosophy, without giving offence and without being charged either with madness or heresy. His introduction is an apology. "It may be proper," he observes, "to apologise for many of the subsequent conjectures on some articles of natural philosophy, as not being supported by accurate observations or conclusive experiments. Extravagant theories, however, on those parts of philosophy where our knowledge is yet imperfect, are not without their use, as they encourage the execution of laborious experiments, or the investigation of ingenious deductions, to confirm or refute them."

The mind of Erasmus Darwin was from the first free as well as original, imaginative as well as mechanical, nervous as well as intrepid, cautious as well as bold, modest as well as ambitious, sceptical as well as conclusive. His was, in every way, a strange mind, a mind not merely dual, but strongly tripartite. In him passion glowed from the organic centres; imagination, powerful and aggressive, literally vaulted into being, while reason towered as a reigning power. In him emotion, imagination, reason, knowledge, wisdom, held equal sway. Hence what seems so complex in his labours, so hard and

so soft, so simple and so difficult, so mystical and so clear, is always before us in his writings. He knew the value of experiment, and conceived experimental data which he had never practised, never seen. He was therefore believed in and disbelieved in with about the same measure of credence; for those who believed in him could not prove, and those who disbelieved could not refute, by any decisive procedure. So he remained a mystery until his grandson, Charles Darwin, playing Aristotle to his Plato, came to shed steadier light from patient and laboured experiment, and to illuminate his foreshadowings and shrewd guesses of natural workings and works by the magic of industry.

His strange genius shines out effulgently in the observations he makes on the development of living things. He had been bred up in the school which Sterne so whimsically describes in the opening chapter of *Tristram Shandy*. The homunculus was the primary man, and the primary analogue of the human animal was in that completed being, *in petto*. Ingenious philosophers, Darwin explains, have found no difficulty in conceiving the manner of reproduction of animals; they have supposed all the numerous progeny to have existed in miniature in the animal originally created, and that these infinitely minute forms are only evolved or distended as the embryo increases in the womb. These, the embryos, must possess a much greater degree of minuteness than that which was ascribed to the devils that tempted St. Anthony, of whom "twenty thousand were said to be able to dance a saraband on the point of the finest needle without incommoding each other."

It was against this theory that Erasmus Darwin raised his objection, and in displacement of which he introduced the theory of evolution. Krause has ably epitomised Darwin's views on this subject under four heads, observing that in them, fifteen years before the appearance of Lamarck's *Philosophie Zoologique*, the principles of evolution were completely set forth. Under the first of these heads the author of *The Botanic Garden* says:—

"When we revolve in our minds first the great changes which we see naturally produced in animals after their nativity, as in the production of the butterfly with painted wings from the crawling caterpillar, or of the respiring frog from the subnatant tadpole, from the feminine boy to the bearded man; when we think over the great changes introduced into various animals by artificial cultivation, as in horses which we have exercised for the different purposes of strength or swiftness, or in dogs which have been cultivated for strength and

courage, as the bulldog, or, for acuteness of their sense of smell, as the hound and spaniel, or for the swiftness of his foot, as the greyhound, . . . and add to these the great changes of shape and colour which we daily see produced in smaller animals from our domestication of them, or from the difference of climates and even of seasons; when we enumerate the great changes produced in the species of animals before their nativity and continued to their posterity, . . . and become convinced that the foetus or embryo is formed by the apposition of new parts, and not by the distension of a primordial nest of germs included one within another like the caps of a conjuror; when we revolve in our minds the great similarity of structure which obtains in all the warm-blooded animals—then one is led to conclude that ‘they have alike been produced from a similar living filament: that in some this filament, in its advance to maturity, has acquired hands and fingers, with a fine sense of touch, as in mankind; in others it has acquired claws or talons, in others toes with an in-turning web or membranes, in others cloven hoofs; while in the bird kind this original living filament has put forth wings instead of arms or legs, and feathers instead of hair’; and that from their first rudiment, or primordium, to the termination of their lives, all animals undergo perpetual transformations, which are in part produced by their own exertions in consequence of their desires and aversions, of their pleasures and pains, or of irritations, or of associations; and that many of these acquired forms or propensities are transmitted to their posterity.”

In many other lines of verse and prose Erasmus Darwin evolves the theory of evolution. He argues that the three great objects of desire—lust, hunger, and security—have changed the form of many animals by their exertions to gratify them; and that a great want of one part of the animal world has consisted in the desire of the exclusive possession of the females, another in the procuring of food, “which has diversified the forms of all species of animals,” while the third, security, has diversified the forms of the bodies and the colour of them. On the other hand, some animals have developed means of pursuit and destruction, “all which seem to have been formed by the original living filaments, excited into action by the necessities of the creatures which possess them, and on which their existence depends.”

In summary of his great subject Darwin adds:—

“From thus meditating on the great similarity of the structures of the warm-blooded animals, and at the same time on the great

changes they undergo both before and after their nativity, and by considering in how minute a portion of time many of the changes of animals have been produced, would it be too bold to imagine that in the great length of time since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind—would it be too bold to imagine that all warm-blooded animals have arisen from one living filament, which THE GREAT FIRST CAUSE endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions, and associations, and thus possessing the faculty of continuing to improve by its own inherent activity and of delivering down those improvements by generation to its posterity world without end?"

It is with real regret I leave Erasmus Darwin as the philosopher and naturalist, there is so much to be said of him in those characters. He is an Atlas in the world of natural history. The world of modern natural history rests on his broad shoulders. His was the mind that gave the original thought of evolution. It is not a mind that in this day of mechanism is likely to be much appreciated. His thoughts have been the energy for what is now considered to be the greatest form of work, the deep analysis of natural details. In brief, as the originator of first principles Erasmus Darwin is still Darwin, and Darwinism is Erasmus. Say that he blended poetry with prose, imagination with fact, emotion with reason; say that his animal propensities were as strong as his intellectual—and perhaps they were—the admission is all the same in favour of Darwinian greatness. He had strong passion. Yes. But if he had wanted passion, there had been no Darwinian doctrine; the passion was the impulse springing from and out of him: the residue was the glorious treasure, the gold left in what had been his living, burning, fiery furnace. What prudes would call his vices were inseparable from his virtues; they were part of his stock of vitality implanted by Nature, from her exuberant hand.

The Physician.

The poet Darwin, the philosopher Darwin, was of all things a physician. He was exceptional in this respect. He was one of the rare men of physic who, being a philosopher, could be esteemed as a practitioner. As a rule, any man of common industry and common honesty can gain the so-called highest places in medicine without being removed one step from the most commonplace knowledge

of the art. The art without the science is all-sufficient and far better for worldly sneers than much science. It must be so, because in current medicine there is no bar of judgment. Nature always runs ahead of the doctor for good or for evil, and if he do but content himself in watching her course, if he do not interrupt her, if he be shrewd enough to calculate and foretell her proclivities without giving her credit, and if he be skilful enough to take credit for all her successes, he must get on. In the practice of the art, therefore, genius has no abiding-place, but is usually expunged from its place ruthlessly. Erasmus Darwin, holding what were considered by most persons even extravagant views on philosophical subjects, posing as a poet, and writing with almost a contempt for public opinion, was nevertheless appreciated as so able a physician that his fame reached London, reached the Court, and led to all but an invitation to him to come to the Metropolis as a Court physician; it reached also the profession itself with such favour that a leading physician of London, Dr. Warren, went incognito to Derby to consult him as "the greatest living medical authority."

There are reasons for this anomalous position, however, which go a long way in explaining it. Darwin made his medical reputation first, and let his originally conceived science come as the crowning work of his life. He, to use a stock phrase, "stuck to practice." He was considered by the common folk, who surrounded him most nearly, as an oddity, a sort of wizard; but that mattered little: they, if anything, trusted him the more as a mystery; his immediate friends thought him a man of genius, who was bound to a profession by circumstances, and who let nothing divert him from the regular course of physic. He also evidently knew his trade as well as his art; and concealing the art in its higher manifestations, kept the trade well in hand. These were good contributories to success, and into them all there ran one other power: passivity in professional and scientific action. Living at Lichfield and at Derby, Erasmus Darwin, monarch of physic in his own limited and quiet sphere, crossed no rival who could assail him or his ways. So little did he commingle with the troubles of metropolitan life, he did not so much as sign the admission book of the Fellows of the Royal Society, and probably never read a lecture or delivered an address in London. He did not, therefore, come into personal collision with men who would have claimed to have been his peers, but in the calm, sequestered vale of life in which his course was cast passed safely into the haven of the illustrious dead.

"No cunning pettifoggers crossed his way ;
 No jealous copyists his steps waylaid ;
 Unwatched, untrammelled, he could dare to stray
 Wherever genius lent its guiding ray,
 Till death, his only foe, the final visit paid."

His grand contribution to medicine was his *Zoonamia* ; or, *The Laws of Organic Life*, a work published in two quarto volumes, bearing date May Day, 1794, and dedicated "To the Candid and Ingenious Members of the College of Physicians, of the Royal Philosophical Society, of the Two Universities, and to all those who study the Operations of the Mind as a Science or who practise Medicine as a Profession." "The purport of the work," so he tells us, "is to reduce the facts belonging to animal life into classes, orders, genera, and species, and, by comparing them with each other, to unravel the theory of diseases." He subordinates the great medical theories current in his day respecting animal hydraulics and chemical changes as the essences of life to the idea that "animation is the essential characteristic" of vitality ; and although he does not ignore chemical and the mechanical views—nay, indeed, uses them both freely—he uses them only as if they were servants, their true and proper place. A hundred years less one have passed since *Zoonamia* appeared, and yet *Zoonamia* remains as fresh as ever, as needful as ever. We working men of the present century have lived all through the past on the inventive genius of the last century, adding possibly not one new thought, but working out details from that which has been bequeathed to us by our predecessors, who sowed the seed of our harvest.

In the *Zoonamia* it is assumed that in the whole of nature there are two essences or substances, one of which may be termed spirit, the other matter. The spirit possesses the power to commence or produce motion, the matter to receive and communicate it ; so that motion considered as a cause immediately precedes every effect ; and considered as an effect, it immediately succeeds every cause. The motions of matter are of two kinds : the primary and the secondary. The primary are divided into three classes : those of gravitation, of chemistry, and of life ; the secondary are those which are given to, or are received from, other matter in motion, and are distinguished by the circumstance that the velocity multiplied into the quantity of matter of the body acted upon is equal to the velocity multiplied into the quantity of matter of the acting body. Darwin deals with the motions of the third class : those of life, including all the motions

of the animal and vegetable world, as well as those of the vessels which circulate their juices, and of the muscles which perform their locomotion, and "of the organs of sense which constitute their ideas."

In section iv. of vol. i. of the *Zoonamia* he formulates what he considers to be the laws of animal causation. He argues that the fibres which constitute the muscles and organs of sense possess a power of contraction, and the circumstances attending the exertion of that power constitute the laws of animal motion, as the circumstances attending the exertion of the power of attraction constitute the laws of motion of inanimate matter. The spirit of imagination is the immediate cause of the contraction of the animal fibres; this spirit resides in the brain and the nerves, and is liable to general or partial diminution or accumulation. But the stimulus of bodies external to the moving organ is the remote cause of the original contractions of animal fibres. A certain quantity of stimulus produces irritation, which is an exertion of the spirit of animation exciting the fibres into contraction. A certain quantity of contraction of animal fibres, if it be perceived at all, produces pleasure; a greater or less quantity of contraction, if it be perceived at all, produces pain; these constitute sensation; a certain quantity of sensation produces desire or aversion; and these constitute volition. All animal motions which have occurred at the same time, or in immediate succession, become so connected that when one of them is reproduced the other has a tendency to accompany or succeed it. When fibrous contractions succeed or accompany other fibrous contractions, the connection is associative; when fibrous contractions succeed sensorial motions, the connection is causative; when fibrous and sensorial motions reciprocally introduce each other, it is termed catenation of animal motions. All these connections are produced by habit—that is, by frequent repetition. The sensorium possesses four faculties—namely, irritability, sensibility, voluntariness, and associability—and these in their active state mean irritation, sensation, volition, and association. *Irritation* is an exertion of some extreme part of the sensorium residing in the muscles or organs of sense, in consequence of the appulses of external bodies. *Sensation* is an exertion of the central parts of the sensorium, or of the whole of it, beginning at some of those extreme parts which reside in the muscles or organs of sense. *Volition* is an exertion of the central parts of the sensorium, or the whole of it, terminating in the muscles or organs of sense. *Association* is an exertion of some extreme part

of the sensorium residing in the muscles or organs of sense in consequence of some antecedent or attendant fibrous contractions.

On the principles above stated, the method of the study of the phenomena of disease is based on the Darwinian system. It sounds strange to us now, but when it is followed out it is far more methodical and philosophic than any of the mere mechanical speculations and inventions of words which characterise our present school. That the theory blended well with practice is indicated throughout the whole of the work, and is particularly conspicuous in matters relating to treatment. Some points are of such singular interest in these respects, I must refer to them.

"Matter produced by suppuration (section xxviii. 2) will lie concealed in the body many weeks or even months without producing hectic fever; but as soon as the wound is opened so as to admit air a hectic fever supervenes even in a very few hours, which is probably owing to the azotic part of the atmosphere rather than to the oxygen.

"When wounds are to be healed by the first intention, as it is called, it is necessary carefully to exclude the air from them. Hence we have one cause which prevents pulmonary ulcers from healing, which is their being perpetually exposed to the air."

He has a very curious and clever notion respecting what he calls "retrograde absorption." He shows that some fluids may find their way from the intestinal canal into the bladder by another passage to the bladder besides the long course of the arterial circulation. The way is that which Hewson demonstrated when he showed that the intestinal absorbents are joined with the urinary lymphatics by frequent anastomosis; "and as there is no other road, we may justly conclude that these fluids pass into the bladder by the urinary branch of the lymphatics, which has its motions inverted during the diseased state."

On the subject of diabetes Darwin is remarkably clear and advanced, advanced, I had almost said, for the present day. He records some good cases of the disease, illustrating the value of opium as a curative remedy, and offering sound advice on the subject of food and feeding. But the most important remarks which he makes relate to the cause of the leading symptom. He believes that the saccharine matter with which the urine of diabetic patients so abounds does not enter the blood-vessels like nitre and asparagus; but the process of digestion resembles the process of the germination of vegetables or of making barley into malt, as the vast quantity of sugar found in the urine must be made from the food

taken and the drink. Secondly, as the serum of the blood is not sweet, the chyle appears to have been conveyed to the bladder without entering the circulation of the blood, since so large a quantity of sugar as was found in the urine in one case—namely, twenty ounces a day—could not previously have existed in the blood without being perceptible to the taste. The mode of the excretion in this instance he supposes to be by retrograde absorption; and he suggests that if the mesenteric glands were nicely inspected in those who die from diabetes, and if the thoracic duct and the larger branches of the lacteals and of the lymphatics which arise from the bladder were well examined by injection or by the knife, the cause of diabetes might be more certainly understood.

The chapter on *Diseases of Irritation* is rich in thought of an original kind. Darwin evidently knew for himself Bacon's axiom, "Heat and cold are the two hands of nature," for his descriptions of the effects of heat and cold on the living body are truly masterpieces. So also is the section (xxxvi.) on the periods of diseases; I know no work which is so careful and so detailed on the subject of periodic manifestations of particular symptoms attending special diseases as this chapter. But indeed all the first volume is filled with matter that excites the warmest admiration, matter that will not die, however long it may be concealed.

The second volume of *Zoonamia* is nosological, and may, perhaps, be considered as an attempt to force into one line of practical thought the ingenious theories of the author. The classification is admittedly too mechanical, but there are comprehensive sections which redeem all errors of the kind named. The essay on the *Sympathetic Theory of Fever* is rich in suggestion, rich equally in description of phenomena, and especially in the description of what he calls the "torpors" of the different systems of organs, respiratory, circulatory, and so on, during the febrile state. He gave this outline of the sympathetic theory of fevers to distinguish it from the mechanical theory of Boerhaave, the spasmodic of Hoffman and Cullen, the putrid of Pringle, and to constitute a foundation and scaffolding for a firm and well-constructed building, "which may stand unimpaired, like the Newtonian philosophy, a rock amid the waste of ages."

A Versatile Scholar.

There are many other characteristics in the life of Erasmus Darwin to which I ought to refer. Indeed, in no life sketch I have

written have I felt so much regret at leaving so much unsaid that ought to be said. I have stated that, in addition to being a poet, a natural philosopher, and a physician, he was an agriculturist, a philanthropist, a scholar, and a man of the world. On these last four parts of his versatile nature I must not long dwell. *The Phytologia*; or, *The Philosophy of Agriculture and Gardening*, is a volume as remarkable as *The Zoonamia*. In *The Phytologia* he appears as a sanitarian of the first order, laying down in other but almost in as precise words Mr. Ward's sanitary proverb, "The sewage to the land; the rain to the river." He advocated the necessity of free ventilation of the house, taught the grand rule of universal cleanliness, and in many other particulars anticipated many lessons which we sanitarians of the present day have urgently enforced. In another and separate treatise, entitled *A Plan for the Conduct of Female Education in Boarding-schools*, he contrasted favourably emulation as against punishment, and insisted that girls should be taught such exercises as skating, swimming, and funambulation, or, dancing on the straight rope.

We have seen that in his earliest days he was mechanically inclined, and all through his life he followed the same bent. He invented a new kind of carriage; a carriage wheel with elastic spokes; a phonetic alphabet; a speaking machine; and a speaking tube, which, to the marvel of his rustic neighbours and the alarm of one of them, he used in his own house.

To Erasmus Darwin as a philanthropist we may give credit that he was one of the earliest physicians to recommend the humane treatment of the insane; and bearing on his physiological insight, Charles Darwin relates with some natural pride that Rosenthal's experiment described by Dr. Lauder Brunton, showing that when an animal is exposed to a rather high temperature the cutaneous vessels become paralysed by the heat and remain dilated even after cold has been applied, leaving the blood exposed over a large surface and causing it rapidly to cool, was anticipated by his grandfather in *Zoonamia*, vol. ii. p. 570, as a mode of accounting for colds and catarrhs.

IN EPITOME.

In epitome, Erasmus Darwin was the most astounding medical light of the eighteenth century, and will probably live longer than any Æsculapian of that century; nay, as long as any of any century. He was a man of impulse as well as of sustained energy. His mind

was born free ; and no fear of superstition, no fear even of death, assailed him. He overcame all difficulties by his perseverance. Impeded in speech by stammering, he succeeded, as cleverly as his friend Priestley, in overcoming that defect ; and how boldly and firmly he wrote his name is shown in the autograph kindly lent me by his granddaughter, Miss Galton, to add to the portrait of the present biography, an autograph which he had put on a visiting card embellished with a tasteful mounting. That he left strength in progeny goes without saying : Charles Darwin, Major Leonard Darwin, now M.P. for Lichfield, and Mr. Francis Galton, are sufficient proofs of this fact.

Erasmus Darwin lived to reach his seventy-first year, dying at Breadsall Priory on April 18th, 1802. He did not expect to live long, but he had recovered from a short illness, and the night preceding his death was as cheerful as usual. At 7 a.m. on April 18th he was seized with rigor, went to the kitchen to warm himself, returned to his study, laid himself on the sofa, became faint and cold, was moved into an arm-chair, and expired, without pain, before 9 o'clock.

One point in this intense life I reserve to the end, that no one may be prejudiced. Erasmus Darwin was one of the earliest, one of the staunchest, of Temperance Reformers. Mr. Charles Darwin, writing to me as President of a Temperance banquet, held at the Crystal Palace on July 11th, 1876, expressed himself as follows :—

“I have been brought to the conviction, from the very large experience of my father and my grandfather, which has extended over a century, that no cause has led to so much suffering and inherited ill-health as the consumption of alcohol.”

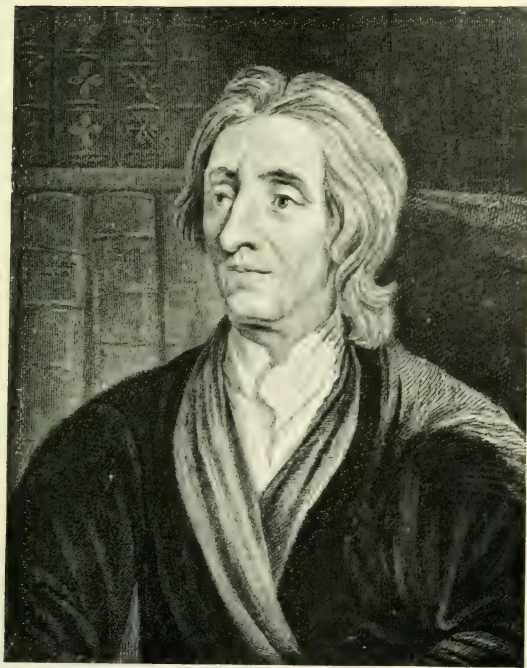
The works of this illustrious grandsire of the illustrious author of *The Origin of Species* are replete with the same truth—a truth that can never be confirmed enough, though doubts should ever sleep.

John Locke, M.B., F.R.S.

IN the pretty town of Wrington, in Somersetshire, John Locke first saw the light on August 29th, 1632. He was born in a two-storied cottage there, the gable of which was in proximity with the churchyard wall of the place. In the year 1882 I paid a visit to Wrington to see this famous cottage. I found it still intact, and was shown the bedroom in which the birth took place. Recently the cottage has been pulled down, and nothing remains to mark the spot save a stone entablature in the churchyard recording the fact that John Locke was born in an adjoining house. The house in 1632 was occupied by one of the brothers of his mother, Mrs. John Locke.

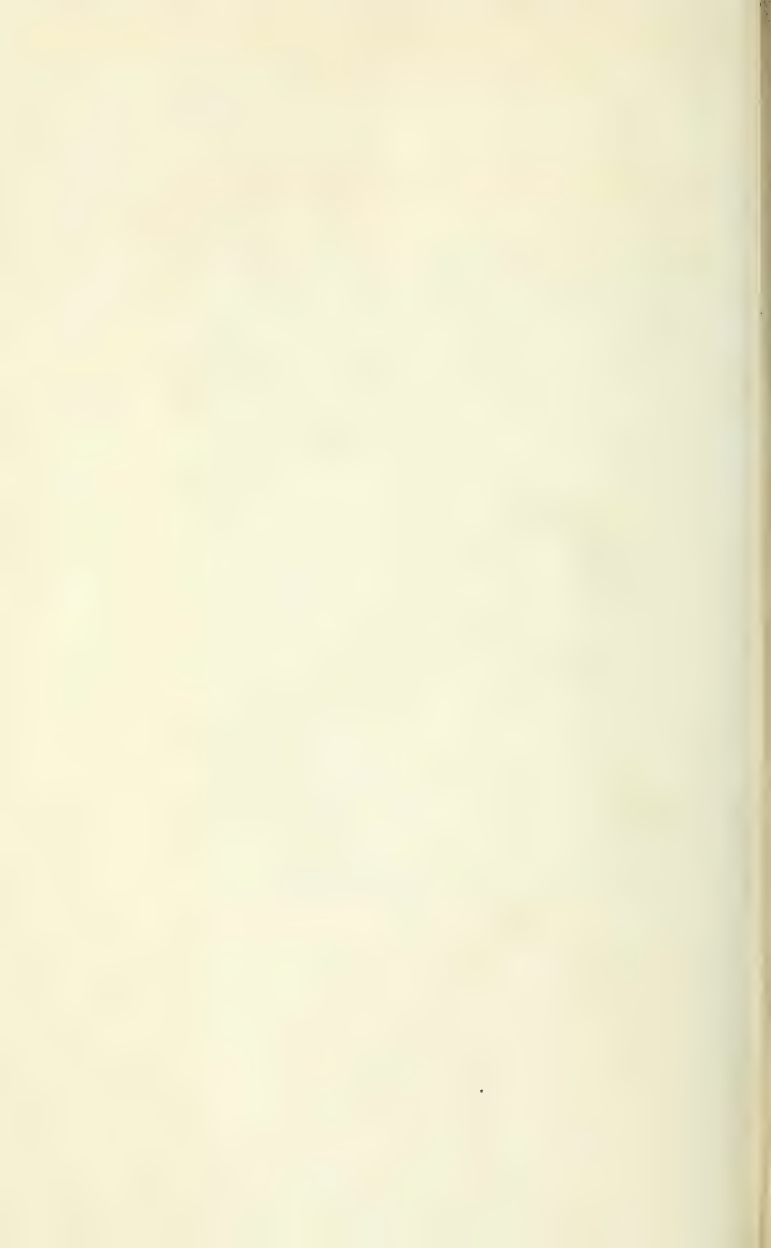
On October 28th, 1704, in the mansion of Sir Francis Masham at Oates, in Essex, a place about twenty-five miles from London, John Locke died, fully and serenely prepared for his immediate departure from this world, and at peace with it.

The period during which the life of Locke extended embraces seventy-two years. They were, through him, years of mighty birth of thought, years of revolution in the philosophy of the human mind, such as have rarely, if ever, existed from the era of Aristotle himself. The birth of Locke occurred, we may almost say, by accident at Wrington, for that place was not the home of his father. Mr. John Locke, his father, resided at Pensford, five miles from Bristol, where he practised as an attorney, and was Clerk of the Sewers in Somersetshire, a position different from what he had filled in his earlier life, for although he was bred to the law and acted for a time as clerk to Francis Baber, Esq., a justice of the peace, he had joined the Parliamentary party, and had held a captaincy in the army of the Parliament. His wife, Anne Locke, however, was a native of Wrington, her father, Edmund Keene, being by occupation a tanner there. It is assumed that Mrs. Locke was on her way to visit her parents at



y^r most humble servant
John Locke

From an engraving by J. P. Kesselwhite, after a painting by Sir G. Kneller, in
Christ Church, Oxford.



Wrington at the moment of the birth of her child, and that she was taken in labour so unexpectedly, she had not time to reach their abode, but putting up at the little cottage above referred to, was delivered of her famous son, who was born and baptised on the same day.

The earliest days of Locke were passed at Pensford, after which he was admitted, under the influence of Colonel Alexander Popham, of Hunt-Street, near Pensford, to Westminster School, from whence he passed to Christ Church, Oxford, graduating as B.A. in 1655; and M.A. in 1658, in the twenty-seventh year of his age.

He remained for some years a student of Christ Church, and continued in the university not particularly well satisfied with the profit of the work usually carried on there in the orthodox system of the schools. He longed for something more, and found what he wanted in the then comparatively new and astounding works of Descartes. He was in this way inducted into science, and was drawn to the pursuit of medical science so earnestly that, although he never graduated as Doctor, he was accepted as a practitioner, and was often addressed by the title of Doctor. There is no doubt that he cultivated physic for a considerable time, and was esteemed by some of the distinguished of the faculty, by one indeed no less than Thomas Sydenham himself, who was proud to repeat that the method of his own work, *Observationes Medice*, had been approved of "by a person who had examined it from the bottom, Mr. John Locke, who, if we consider his genius and penetrating and exact judgment, or the purity of his morals, has scarce any superior and few equals, if any, living."

Locke was not strictly Dr. Locke, although he understood something of the art of physic, and was applauded by a real master of the art in such high terms; nor did he settle down, in the strict meaning of the words, to practice. In 1664, when Sir Walter Vane was appointed envoy from the English Court to the Elector of Brandenburg, he accompanied the envoy, not in the character of physician, but as secretary, a post to which he was well entitled, owing to the attention he had paid to what may be called philosophical politics or political science. The visit did not last very long; he returned to Oxford within twelve months, and resumed with renewed ardour his philosophical pursuits, his mind more than ever bent towards those studies which bore on natural phenomena.

At this point in the career of John Locke, an event occurred, partly medical, partly political, partly social, which changed largely

the whole course of his life in the coming nearly forty years that belonged to him. In 1666 he was brought into contact with Lord Ashley, a philosophical politician and scholar, who later in life, under the title of Earl of Shaftesbury, played a strange part on the stage of the world. Lord Ashley had sustained a fall, and had, his biographers relate, injured his chest so much that an abscess formed in it. For relief he was advised to drink the mineral waters of Astrop Wells, near King's Sutton, in Northamptonshire; and he wrote, consequently, to a well-known physician at Oxford, Dr. Thomas, asking him to obtain a quantity of the said waters to be taken at Oxford. Thomas at that time was away from home, and he deputed the task to his friend Mr. Locke, who undertook to receive Lord Ashley and have the waters ready on his arrival. Through some error on the part of the person whom Locke had requested to fetch the waters, they were not ready when the patient reached Oxford, and Locke was obliged to wait on him and excuse the delay. That interview between Lord Ashley and Locke sealed at once what may be called their friendship, for it showed an affinity between the two men which reached, in course of time, to close and friendly intimacy. Locke was detained to supper, was engaged for dinner the next day, and later on was invited to go to Sunninghill to stay with his patient. The invitation was accepted in the summer of 1667; and some time afterwards, at the request of Lord Ashley, Locke took his case entirely in hand as medical and surgical adviser, with results that will be recorded on a succeeding page.

We have cause to wonder why Locke did not systematically qualify for physic at this date. Intended at first for the Church, he had, after due thought, given up that project, and had allied himself intimately with the profession of physic. He had become acquainted with the Hon. Robert Boyle, had made experiments with the then new instrument the barometer, had taken to the study of chemistry, and had every means for qualification at command. The curriculum was easy enough. To get the preliminary M.B. it was merely necessary to attend the courses of the Arabic Professor and the Professors of Anatomy and Medicine, followed by a few disquisitions in the medical school. The M.B. obtained, it was merely a question of waiting four years to gain the M.D. How simple! But Locke refused or declined to pass through these formalities. He did not object to attend lectures, for he attended the lectures on chemistry of Peter Stahl in 1663; but he seems to have ignored the professional instruction for the degree, as if it were imperfect and antiquated,

a mere hash of the teaching of Hippocrates and Galen. To qualify him after the time for the regular method had passed, an attempt was made by Lord Clarendon, the Chancellor of the university, to get for him the degree of Doctor of Physic by special grace. Strong as the request was, it was refused by the university, and subsequently would have been refused again had it been pressed, for Locke was not in favour with the ruling body of the university.

However, through the King (Charles II.) he got permission to retain his position as a student at Christ Church, together with all the rights, profits, and emoluments thereunto belonging, without taking holy orders upon him, according to the custom of the college. He also assisted in physic at Oxford, in alliance perhaps with his friend Dr. David Thomas, with whom, as he communicated to Boyle, he entered upon "a new sort of chemistry, that is, extracting money out of the scholars' pockets." This was simple humour. Locke had no need to strive after emoluments of practice. His father, who had died on February 13th, 1663, had left him estates in Somersetshire; his only brother, Thomas, had died of consumption in the same year, leaving probably to him a further source of income; and he had the "emoluments," whatever they might be, of his studentship at Christ Church. He was, therefore, a man of independent means—a fact which accounts for his independency of character and of action. It is important also to repeat that, although he would not submit to the orthodox system of entering on a medical career, he was, in fact, as we should in this day say, an unqualified practitioner, he retained the friendship and esteem of the best of his medical cotemporaries. David Thomas, Sydenham, Richard Lower, Mapletoft, Willis, not to name others of lesser note, were his good friends. He was strictly at this period an unqualified practitioner, but he was no charlatan. He knew what he was about in physic, and pursued the art with the tact and learning of a practical man as well as a far-seeing philosopher.

THE PRACTITIONER OF PHYSIC

It has been urged by some scholars that John Locke was never engaged in practical physic, and that at best his connection with the art was nominal. From what has already been told, this theory is shown to be incorrect; and now the time has arrived when it is in order to indicate how far he was allied to our profession, notwithstanding his rather irregular method of alliance. In his day, although it was not necessary for a man to hold a diploma to practise physic,

it was customary for those who were of the higher class to take the university degree in physic and to become connected afterwards with the Royal College of Physicians of London. Locke did neither, and still practised far more extensively than is commonly supposed. He took part in medical, surgical, and obstetric practice, and was obviously devoted to the occupation. To show how this came about we must return to his connection with Lord Ashley.

We have seen that in 1666 Locke made the acquaintance of Lord Ashley at Oxford, and he had been resident at Exeter House, in the Strand, London. In 1667 he was at the same nobleman's country mansion at Wimborne St. Giles, Dorsetshire, for in November of that year he wrote to Boyle from that house regretting that he had not been able to perform some chemical experiment, although his fingers "itched to be at it." He was now in the position of a medical attendant on the Ashley family, and on the head of it in particular. He came up to London with his patient, and was with him in 1668, when, in May of that year, the said patient's life was despaired of, the abscess, or, as Pepys called it, "the imposthume in his breast," which had troubled him since 1661, having discharged itself into the abdomen. The danger to life was now so imminent that Locke proposed, as a kind of last resource, the plan of making an opening into the abdominal cavity and letting out the offending matter. There was a consultation on this point on June 11th; and, next day, with the concurrence of his colleagues, Locke effected an opening by the use of a caustic, and with such good success that from that time Lord Ashley commenced to recover. In order to keep the wound he had made open, Locke very wisely introduced a tube of silver into it, and so established what in our time we designate drainage of the abscess. Later on another question arose, namely, whether the tube should always be left in the wound or whether it should be withdrawn, and the opening should be allowed to heal up. The subject gave the operator much concern. He addressed letters to Sir George Ent, Dr. T. Clark, Dr. Micklethwaite, and Dr. Francis Glisson asking them to give him their opinions. He also took the advice of Abbé de Briolay de Beaupreau, who replied in April, 1669, that he could hardly decide whether he "ought to admire most the wise and timely proceedings of my lord's physicians or the exactness of the author of the relation, both for the elegance of his style and the judicious remarks with which he illustrated his narrative." The result was that, with one exception, by Dr. Clark, it was decided, on Locke's initiative, that the tube should be kept in the wound so long

as there was any discharge, lest by the closure there should be re-accumulation of poisonous substance and return of danger. The tube was never removed except for the temporary cleansing of it, and although, as Mr. Fox Bourne observes, "satirists afterwards made great fun of Lord Ashley's silver tube, the silver tube kept him alive to hear their satire."

In addition to his medical duties in the Ashley family, Locke acted as tutor to his lordship's only son, a feeble youth, for whom the tutor had to help to find a wife in the Lady Dorothy Manners, of Belvoir Castle, the daughter of the Earl of Rutland. Both parties in this love-match were young, the youth seventeen, the lady twenty, but the marriage turned out well. In January, 1669-70, Locke attended the Lady Dorothy during a miscarriage at Exeter House, and in 1670-1 he delivered her of a child, born to take, as the third Earl of Shaftesbury, a leading place in the controversial literature of his generation. When Lady Dorothy left London for the country she confided her baby to the care of her medical friend, and by her correspondence with him showed her gratitude for his skill and her affection for all his kindness. Lady Ashley, the third wife of Lord Ashley, seems, too, to have had equal confidence in and gratitude to the friend as well a physician of their family. All the influence that could be brought to bear in his favour failed, however, to move the stubborn university in the matter of conferring on him the coveted M.D.

In London our scholar became the close friend of Dr. Mapletoft, of Dr. Sydenham, and of other men distinguished in letters and science. He accompanied Sydenham in his practice, took charge of his small-pox patients, backed him up in his new treatment of variolous disease, and did all in his power to make the works of his master in physic widely and favourably known.

Fox Bourne, in his most painstaking *Life of Locke*, has referred to several cases of disease treated by the philosopher in and after 1667. He treated a kitchenmaid in the Ashley household for dropsy; Peter Locke—a cousin—for a hard cough; a young child for an inflammatory fever; a woman for hysteria; a "sturdy youth" for rheumatism; a girl for fever; and a case of angina pectoris, which he "cured." In 1669-70 he had under his care cases of erysipelas, of lues venerea, of quartan ague, of dropsy, of inflammatory fever, of disease of the kidneys, of stricture, and one of fever, which, after an attendance of fourteen days, ended fatally. He also had for a patient William Sydenham, son of the great doctor, malady not specified.

To the literature of medicine Locke did not add much that was worthy of preservation. A short Latin essay or thesis entitled *Respirationis Usus* is sometimes cited, although it is of crude physiological quality, and there is extant the manuscript of an unfinished treatise bearing two suggested titles, one *Ars Medica*, the other *De Arte Medica*. Mr. Fox Bourne, who has published the whole of this last-named fragment, says that the manuscript bears marks of frequent corrections, some of which render it here and there clumsy in expression and almost ungrammatical. "But," he adds, "as it stands it is a capital index to one current of Locke's thoughts when he was thirty-seven years of age." The essay is dated 1669.

It is quite true, as stated by Bourne, that the treatise conveys the current thoughts of its author on the medicine of his own time and of previous times; but it is just to add that neither his learning nor his judgment shines very brilliantly in this effort. The whole, in fact, is an attempt to set up the empirical system of medicine, after the school of Sydenham, as against the experimental system which had so recently been installed by William Harvey and so magnificently advanced by Thomas Willis. The keynote to the argument was written a year previously, 1668, in a paper called *Anatomica*. There was another hand, that of Sydenham, in this preliminary note, both authors being critical as to the value of anatomical knowledge to the practising physician. Sydenham in his own writing complains of those who "pompously and speciously prosecute the promoting of this art by searching into the bowels of dead and living creatures, as well sound as diseased, to find out the seeds of discharging them." Locke caps this statement by saying that "anatomy is absolutely necessary to a surgeon and to a physician who would direct a surgeon in making an incision, in trepanning, and in several other operations, and that there are other cases in which anatomy is useful, if not necessary, to medical practice. But," he argues, "that anatomy is like to afford any great improvement to the practice of physic, or assist a man in the finding out and establishing a true method, I have reason to doubt. All that anatomy can do is only to show us the gross and sensible parts of the body, or the vapid and dead juices, all which, after the most diligent search, will be no more able to direct a physician how to cure a disease than how to make a man; for to remedy the defects of a part whose organical constitution and that texture whereby it operates he cannot possibly know is alike hard as to make a part he knows not how is made."

It was in keeping with such an opinion as is expressed above that Locke reasoned on the subject *De Arte Medica*. It is not possible to say much in favour of this unfinished piece, and it had almost been fortunate if he had destroyed it as an unsatisfactory and crude thesis. His intention, he said, was "to propose some few things to the consideration of the learned men of this so useful a faculty, and to excite their mutual assistance to perfect the art and establish a settled certain practice in the cure of sicknesses, that so, the large catalogue of yet incurable diseases and the frequent sad events of the rest being every day lessened, the diffidence which some sober men upon serious consideration seem to have of the art itself and the disrepute which others industriously labour to bring upon the practice of physic being by the daily growing success of the physicians removed, the industrious and learned practitioners of physic may, with more confidence and satisfaction, attend their calling, when they could no longer be upbraided with their confessed *opprobria medicorum*, which every day yield to the efficacy of their medicines or well-ordered methods."

In a further passage he insists that "he who in physic shall lay down fundamental maxims, and from thence drawing consequences and raising disputes, shall reduce it (medicine) into the regular form of a science, has indeed done something to enlarge the art of talking and perhaps laid a foundation for endless disputes ; but if he hopes to bring men by such a system to the knowledge of the infirmities of human bodies, the constitution, nature, signs, changes, and history of diseases, with the safe and discreet way of their cure, takes much what a like course with him that should walk up and down in a thick wood, overgrown with briars and thorns, with a design to take a view and draw a map of the country. These speculative theorisms do as little advantage the physic as food of men, and he that thinks he came to be skilled in diseases by studying the doctrine of the humours, that the notions of obstruction and putrefaction assist him in the cure of fevers, or that by the acquaintance he has with sulphur and mercury he was led into the useful discovery that what medicines and regimen are as certain to kill the latter end of some fevers as they cure in others, may as rationally believe that his cook does his skill in roasting and boiling to his study of the elements, and that his speculations about fire and water have taught him that the same seething liquor that boils the egg hard makes the hen tender."

The opinions thus expressed are characteristic of the mind of Locke ; they are metaphysical *versus* physical reflections. For him

Bacon, with his experimental system, had lived in vain ; for him Harvey had lived almost in vain ; for him his illustrious cotemporary Willis, unravelling the mysteries of the nervous system, lived and laboured in vain. He wanted no experimental basis for practical physic ; his sole ideal was of a pure empiricism, as if one should say, "I have treated a set of symptoms called a disease by such and such a method, and finding the method effective, have been content to know no more." It was Sydenham beyond Sydenham, but it was characteristic of the man, and as a line of reasoning it fitted well with metaphysical studies. He contemplated carrying his principles into details ; he intended, he says, to treat of—" (1) the present state of the faculty of medicine as it now stands in reference to diseases and their cure ; (2) the several degrees and steps whereby it grew to that height it is at present arrived at by experience ; by method founded upon philosophy and hypothesis ; by botanics, by chemistry, and by anatomy ; (3) what may yet further be done, *i.e.*, by what means and method the practice of physic may be brought nearer to perfection."

It might have been a matter of interest, if not of service, to have seen all the designs of this work carried out under the hand of the master. We are not favoured so far. The design is but roughly sketched when it stops short in the unfinished sentence. "Some diseases, like some weeds—" . . . and so ends *De Arte Medica*, which Fox Bourne thinks was "mainly an exercise for its author, and with no thought, or only a very vague thought, about its future publication." The suggestion is possibly correct ; yet it is certain, with Sydenham in evidence, that the ideas sketched out represented very fairly an empirical school of physic, which had its day, and still has it, in an almost exclusive degree. The ideas peer out again in a different style in a preface and dedication which Locke wrote to a work by Sydenham on small-pox, a work that was never published as a distinct or special treatise.

The casual practical life of Locke in the science and art of physic may be said to have closed in 1673-4, but the theory was still to him a matter of great interest. On November 23rd, 1668, he had been elected a Fellow of the Royal Society, on the proposition of Sir Paul McNeil, a friend of Boyle's. He was evidently duly valued in the Society, and very early had offices of trust deputed to him, but he did not seem able to attend to the duties of office, and when he was promoted to the council did not retain his seat there more than a single year at a time. He appears to have had a taste of founding

a medical museum, for in 1673 he received from Sir Peter Colleton, from Barbadoes, a jar of country tar, supposed to have qualities of a sanitary character of remarkable virtue, and even to have medical value for the cure of sciatica. With this there was also a pot of tarara root, supposed to be an antidote to the poison which the Indians put on their arrow points, in order to render the wounds made by them fatal.

In 1674, precise date not very clear, Locke became a qualified practitioner by having conferred upon him the degree of M.B. of the university of Oxford. About the same time he obtained two medical studentships at Christ Church. The doctorship might now have quickly followed, but there were enemies still lurking at headquarters, and the doctorate never came to him. By a worse fate he, ultimately, received through the King an order for his dismissal from the studentships, owing to charges of a political character against him, to which reference will have to be made in a succeeding page. He travelled about from this time for many years, visiting France, Holland, and parts of the continent of Europe, making often medical observations and cultivating medical acquaintances, but only occasionally exercising his medical skill. In Paris he became the friend of Nicolas Thoynard, a great scholar, to whom he wrote giving special instructions about a chemical experiment which confirmed him in the view that in fermentation a new air is generated, and about other learned topics. While in France he also wrote (March, 1677) a letter to Denis Grenville, an old friend in England, on the subject of recreation, suggesting that the best time for recreating the mind is when it feels itself weary and flagging. "The mind," he says, "may be wearied with a thing when it is not weary of it," to which he wisely adds "that the properest recreation of studious, sedentary persons, whose labour is of the thought, is bodily exercise, of those of bustling employment sedentary recreation; that of all bodily exercises those in the open air are best for health; and that it may often be so ordered that one business may be made a recreation to the other."

In 1679 Locke, being again in England, was engaged in consultation at Olantigh, in Kent, on a Mr. Beavis, whose case he watched and made notes upon with considerable care. During this period he became ill himself, and from September 5th to the 14th treated himself for the cure of a low fever attended with a "subsulting pulse," which became steady as his "stomach and strength came back to him." He speculates here as to whether the recovery was

due to "that sympathy between the hand and stomach mentioned by Dr. Godefroi."

In the same year he comments strongly on the nonsense of fashion, the vicious practice of "strait-lacing." "Narrow chests, short and stinking breath, ill lungs, and crookedness are the natural and almost constant effects of hard bodice and clothes that pinch. The way of making slender waists and fine shapes serves but the more effectually to spoil them." . . . "Tis generally known," he adds, "that the women of China, imagining I know not what kind of beauty in it, by bracing and binding them hard from their infancy, have very little feet, whereby the free circulation of the blood is hindered, and the growth and health of the whole body suffers. How much greater inconveniences may we expect when the thorax, wherein is placed the heart and seat of life, is unnaturally compressed and hindered from its due expansion."

The above extract was included in *Some Thoughts concerning Education*. It indicates the bent of his mind towards the introduction of hygienic principles into practical medicine. The same tendency is shown in his observations respecting the relation of weather to disease, and in his references to the London bills of mortality. The constitution of the autumn of 1679 was, he records in his journal, "intermittent and quaternary." In September there was whooping-cough; in November people had violent coughs without spitting. On November 27th he notes that the mortality for the week in and about London rose to two hundred and twenty-two, an increase scarce ever known out of times of pestilential diseases. The epidemical disease that came in about this time, and caused this mortality, was a dry but violent cough, which produced a "peripneumonia," probably influenza.

Locke himself was a sufferer from some thoracic disease, supposed to be of phthisical nature; and this circumstance naturally led him to the study of phthisis. He delivered the result of his study in a commentary on some observations made by Sydenham, and which he had confirmed. The most common cause of phthisis he considers to be a cough taken in the winter season. Under the bitter cold preceding the winter solstice, everybody coughs, the transpiration being suddenly checked. So the lungs suffer; and, in extreme cases, extravasated matter is collected up and down in the vesicles of the lungs, which at length have little bags or cystides growing about them, the matter contained in them turning by degrees into pus. "The lungs being thus repleted with pus, from them flow purulent

streams into the blood, which cause a sort of putrid fever, whose access is towards night, and its solution towards morning, by a profuse and weakening sweat. Lastly, towards the completing of this tragedy comes on a diarrhœa colliquative, which arises partly from the putrid matter discharged on the bowels by the mesenteric artery and partly from the tone of the bowels being lost and destroyed, and then death is at hand." After describing the hectic fever of phthisis and dwelling on the diagnostic importance of the colliquative sweat, he tells us what still remains true: of the great frequency of the disease in London. He seems to have considered bad air to be the one leading cause of the mortality, and in a kind of inferential manner suggests London coal smoke and its sulphurous products as a possible cause, a theory supported, he thinks, by the statement that in Newcastle "there are more consumptives in proportion to its inhabitants than are almost anywhere else to be found."

On the subject of the treatment of phthisis Locke was once more hygienic, anticipating many of the rules I and others have written on the same subject.* His grand remedy was long and persistent riding on horseback in a good air, "which refreshes both the lungs and the blood." Horse exercise does better, he thinks, in phthisis than in any other case, and in his journeys the patient need observe no diet, but may eat and drink what agrees with his appetite; "only let him observe that the linen in which he lies be dry, for the dampness of it will quickly bring back all the mischief."

Fox Bourne states that the memoir from which these passages have been extracted is contained in a curious manuscript volume entitled *Extracts of Sydenham's Physic-books, and some Good Letters on Various Subjects*. It was compiled probably in 1685, when the author was living in Holland, or soon after. How far the extracts are mere transcripts from Sydenham's notes and how far they include traces of Locke's own work cannot be easily decided. Other extracts, about which we are in the same dilemma, refer to several important diseases, particularly to diseases of the kidneys, apoplexy, epilepsy in children, delirium, gout, pleurisy, asthma, dropsy, and small-pox.

THE METAPHYSICIAN AND PHILOSOPHER.

It is time to leave "Doctor" Locke—for so he was designated by his friends—to study him in his better-known character as John

* See my treatise on *The Hygienic Treatment of Pulmonary Consumption* (J. Churchill & Sons, 1856).

Locke the philosopher. In his early life at Oxford he had been a lecturer and teacher of Greek, rhetoric, and moral philosophy. At a later period, after his acquaintance with Lord Ashley, he became a writer on various subjects other than medical, as on *Virtue and Vice: a Utilitarian Scheme of Life*, on *Toleration*, and other kindred subjects, towards which his thoughts were led by Lord Ashley, who, while appraising him as a professor of physic, thought of him still more as a philosopher.

In 1663 the State of Carolina was presented by Charles II. to eight "lords proprietors"; of these Lord Ashley held the lion's share, and in 1669 an expedition was fitted out for properly colonising the new state. The story of this expedition includes a curious and most interesting bit of English colonial policy; but here I can only note that Locke took part in drawing out the fundamental constitution of Carolina and introduced many suggestions on which the liberty and progress of that constitution rested. In course of time, under the guidance of Ashley, by this date known as Earl of Shaftesbury and Minister of State, Locke became more distinctly political, and held the appointments of Secretary of Presentations to the Council of Trade and Foreign Plantations.

From 1675 to 1679 he passed much of his time on the Continent, pursuing new studies at Montpellier and making friends of philosophers of all classes. In 1679 he resumed work in England, and continued here until after Shaftesbury's so-called conspiracy and death, when, being suspected of implication in some of the treasonable essays of the day, he found it expedient to seek protection in Holland, whither he went in 1684, and was most unjustly expelled from Christ Church, by command of his King, after a connection with the institution of about thirty years.

The period of his residence in Holland marks the one great epoch in the life of Locke. In the field of medicine he might have taken and sustained a high position had he made the art his chief occupation, overtopped, however, by Sydenham and other of his compeers. In politics he might have made a respectable stand, but his enfeebled physical powers would have prevented him from taking a commanding place. Philosophy, metaphysics, were in accord with his mental and physical nature. He could think and argue with all the sweet subtlety of his disposition without excess of activity and away from storm and vicissitude. Lord Ashley had detected these capacities and encouraged them in their development; and now they broke forth in the two ever memorable essays, one on the *Conduct of the*

Understanding, the other, more comprehensive, entitled *An Essay concerning Human Understanding*.

It was at one time customary to look upon the first-named of these essays as a kind of rider to the second ; it is now more common to take the first-named first, as if it were the prelude of the second. The true position probably lies between these views. The treatise on the *Conduct of the Understanding* came secondary to that on *Human Understanding*, was, in fact, a kind of exposition—I had almost said an apology—for the larger work, and yet it may have been the summary of the first thoughts of its author in the philosophical line. The opening passage of the work on the *Conduct* conveys this idea, for in a certain and clear sense it breathes the whole breath of the author. “The last resort a man has recourse to, in the conduct of himself, is his understanding ; for though we distinguish the faculties of the mind and give the supreme command to the will, as to an agent, yet the truth is, the man who is the agent determines himself to this or that voluntary action upon some precedent knowledge, or appearance of knowledge, in the understanding.” The whole philosophy of Locke is concentrated in this one sentence ; all the rest is, as it were, an expansion of this root of thought and exposition.

OF HUMAN UNDERSTANDING.

There are two epistles connected with the work on human understanding which indicate its origin. The first is an epistle dedicatory to Thomas, Earl of Pembroke, bearing date “Dorset Court, May 24th, 1689,” the other an epistle to the reader. The first need not concern us, for it is merely after the complimentary fashion of the day ; but the second tells us the fact that the essay sprang out of the discussions of a little coterie of friends who were accustomed to meet the bachelor author at his chambers for the purpose of conversation and mutual enlightenment. These friends having a while puzzled themselves without coming any nearer a resolution of the doubts which perplexed them, it came into his thoughts that they took a wrong course, and that it was necessary to see what objects their understandings were or were not fitted to deal with. Some hasty and undigested thoughts on a subject he had never before considered, and which he set down against their next meeting, gave the first entrance into the discourse on the human understanding, and the work thus commenced was continued by entreaty ; was written “by

incoherent parcels" ; and, after long intervals of rest, resumed again, as humour or occasion permitted. At last, in a retirement where an attendance on his health gave him leisure, it was brought to a conclusion. The work, he further tells us, "was the diversion of some of his idle hours, and if the reader had half as much pleasure in reading it as he had in writing it, he (the reader) would as little think his money lost, as the author his pains. This is not as a commendation, but simply as a fact."

A short epitome of the treatise was published in 1688, and met with severe criticism. A first edition of the completed work followed, in which were many faults, owing to bad corrections, explained and apologised for in the second edition. Editions then went on up to the sixth, with alterations and additions ; and to this edition the author wrote the epistle to the reader to which I have been making reference.

In the design of the work Locke cast aside at once all considerations of a physical nature bearing on the action of the organs of the mind. He was in this respect the antipodes of Thomas Willis. Willis was all experimental, all physical ; Locke was all speculative on sound principles, all metaphysical. He breathed even a spirit of contempt for the physical. "There are speculations which, however curious and entertaining, I shall decline as lying out of my way in the design I am now upon. It shall suffice to my present purpose to consider the discerning faculties of a man as they are employed about the objects they have to do with." In the determination so formed he was probably very wise, since his own turn of thought was foreign—may one say without offence, unequal to the task of striving to understand by experiment and by anatomy the physical principles of mental action ; but was it not going somewhat too far to stigmatise such studies, so profound and basic, as "curious and entertaining" ?

In the method of his work he pursued the following courses :—

First, he inquired into the original of those ideas, notions, "or whatever else you please to call them," which a man observes and is conscious to himself he has in his mind, and the ways whereby the understanding comes to be furnished with them.

Secondly, he endeavoured to show what knowledge the understanding has by these ideas and the certainty, evidence, and extent of it.

Thirdly, he made inquiry into the nature and grounds of faith or opinion, whereby he meant that assent which we give to any pro-

position as true, of whose truth yet we have no certain knowledge, together with reasons and degrees of assent.

Into what debatable ground John Locke entered when he published a book founded on such principles we, in this advanced day, can easily imagine. It would be a startling treatise even at present if it were set free amongst us for the first time. We should wonder, all of us; but some would admire, and many would condemn. The originality of the author as well as his audacity appears in the opening of the second chapter. At the close of the first chapter he takes great pains to define his use of the word "idea," explaining that he uses it "to express whatever is meant by phantasm, notion, species, or whatever it is that the mind can be employed about in thinking." He takes it for granted, as a premise, that there are such ideas in men's minds; every one is conscious of them in himself, and a man's words and actions will satisfy him that they are in others; the first inquiry is how they came into the mind. Presented in this form, the famous second chapter opens with the bold assertion, very bold at the time it was written, that there are no innate ideas in the mind. It had been commonly taken for granted that there are certain principles, both speculative and practical, universally agreed upon by all mankind, which the souls of men receive in their first being, and which they bring into the world with them as necessarily as they do any of their inherent faculties. Any one would easily grant that it would be impertinent to suppose the idea of colours innate in a creature to whom God has given sight and a power to receive them by the eyes from external objects; it were no less unreasonable to attribute several truths to the impressions of nature and innate character when we may conceive in ourselves faculties fit to attain an easy and certain knowledge of them, as if they were, primitively, imprinted on the mind. The original of all our knowledge is by the impression made on the senses by outward objects; the mind in time comes to reflect on the ideas got by sensation, and thereby stores itself with a new set of ideas, which Locke calls "ideas of reflection." "Thus," to quote the author's own words, "the first capacity of the human intellect is that the mind is fitted to receive the impressions made on it either through the senses by outward objects, or by its own operations when it reflects on them. This is the first step a man makes towards the discovery of anything, and the groundwork whereon to build all those notions whichever he shall have naturally in this world. All those sublime thoughts which tower above the clouds, and reach as high as heaven itself, take their

rise and footing here; in all that good extent wherein the mind wanders, in those remote speculations it may seem to be elevated with, it stirs not one jot beyond those ideas which sense or reflection has offered for its contemplation."

If I were to venture on a complete analysis of the treatise on the human understanding, I could give no better view of it than has been rendered in the above passage by Locke himself. The passage is written with great perspicuity, which cannot be said of many other passages. It is also written with a splendour and even poetic beauty, resembling some of the passages of Sir Thomas Browne, so that it stands like a star brilliant through a gap in clouds, sombre and darkening the firmament. Hume and other authors have utilised it in their fashion, but only to rob it of its force and its beauty.

In the admirable chart and analysis of the essay on *Human Understanding*, edited by Mr. J. A. St. John, the argument is put in a short and comprehensive form. Taking the word "idea" as comprehending whatsoever is the object of the understanding, the matter of the argument is placed under five heads: (1) Ideas not innate; (2) The origin of ideas; (3) Ideas considered with regard to their objects; (4) Ideas considered with regard to their qualities; (5) Of knowledge, reason, faith, and judgment. This is an able division, and renders the minutest study of the author a comparatively easy task.

Locke started on his great work with the intention of being quite silent on all strictures made upon it. He was, as might be expected, drawn from the course he had determined on by the criticisms that followed of Dr. Stillingfleet, Bishop of Worcester, and led to a long epistolary argument, yielding matter for a treatise, which, according to Fox Bourne, is about equal to the dimensions of the original essay, three-fourths of which were contributed by Locke himself. In the end Locke came out the victor. His opponent was able, scholarly, "sly," but he had not the reasoning power of the philosopher. He allowed a sort of spiritual orthodox passion to lead him astray, and, as a matter of fact, raised an indirect attack on some of the heretics of the day rather than on the lay-writer who, in metaphysical form, advanced the new doctrines on the laws of mental action. In his concluding letter Locke, seeing and feeling the victory he has won, thanks the Bishop in polite, if sarcastic, tone for the pains he has bestowed on the essay which roused his vehemence and his wrath.

OF THE CONDUCT OF THE UNDERSTANDING.

The small essay under the above-named title is an important addition to, and, one might say, a companion edition of the more ambitious work. For my own part, I enjoy this essay more than any other of the author's productions, and wish I could follow its instruction as easily as I can admire its construction. The whole is comprised in a hundred and eleven octavo pages, is readable in four or six hours, understandable in four or six days' careful study, and once read and understood is useful and utilisable for the whole of a long life. There is also this beauty in the teaching, that there is no obscurity in it. It springs from the pure observation of nature. But as, to use a reviewer's common phrase, I would rather the essay should speak for itself to those who have not studied it, I leave it without another word.

THE SOCIAL AND SANITARY REFORMER.

It has been shown incidentally in previous pages that Locke was alive to the social and sanitary requirements of his time. He was far in advance of even later times on these subjects, and a good and practical essay on them, applicable now, might be culled out of his labours. In the service of the State he filled the office for four years and some odd months of Commissioner of Trade and Plantations, and in this office suggested many projects of a social kind that, if carried out, would have had an important after-influence, though whether for good or for evil admits of dispute. He held strong views on political economy, and rather narrow ones on reciprocity of trade with Ireland. The most interesting of all his labours of a social character is his scheme of poor-law reform in England—a reform which had been lying open for revision from the time of the famous Act of Elizabeth, and which remained in waiting until the first third of the present century. The suggestions made by Locke in his scheme were often very hard and unpractical; but he struck at the roots of many evils, as, for instance, where he observed that “the first step towards the setting of the poor to work ought to be a restraint of their debauchery by a strict execution of the laws provided against it, more particularly by the suppression of superfluous brandy-shops and unnecessary ale-houses, especially in country parishes not lying upon great roads.” Another point on which he dwelt was education. He suggested that “the guardians of every parish should be able, under a new law, to provide working schools,

to which the children of all such as demand relief of the parish, above three and under fourteen years of age, whilst they live at home with their parents and are not otherwise employed for their livelihood, shall be obliged to come." As a sanitarian Locke really takes first rank. He wrote to Dr. Molyneux that "his zeal for the saving of men's lives and preserving their health was infinitely to be preferred to any speculations never so fine in physic." He carried out sanitation personally also as well as by precept. He was neat in attire, active in habit. He was fond of working in the garden, of pedestrian exercises, of horse and of carriage-riding. He was simple in diet, and, like a truly wise man, chose water as his ordinary drink, by which selection he believed he had lengthened his life, although born of a feeble constitution. He maintained cheerfulness even in illness, and but a short time previous to his death took a lively part in a wedding banquet he himself gave to a bridegroom, his friend King, and his bride, the latter a cousin by relationship. He himself drew out the list of dainties for the feast. "While we are alive let us live," was his motto.

TO THE END.

After passing through various changes of residence, John Locke, to the end a bachelor, yet not without a love-song in his life which never died out, settled down finally in his later years at a mansion called the Manor House, at Oates, in Essex. Oates was about a mile from the village of High Laver, about five miles from Harlow, four from Ongar, and six to seven from Epping, a sweetly quiet spot, and one that suited his health—the air pure, the scenery serenely beautiful, the rides and drives enticing. The Manor, long destroyed, belonged in Locke's time to a baronet named Sir Francis Masham, an easy-going, happy country squire, twice married, his second wife Damaris Cudworth, the daughter of Dr. Cudworth—one of Locke's early friends—for whom he felt a sincere affection, and who, in return, felt an equal affection for him.

In 1690 Locke, very ill and wearied of London life, made a visit to Oates, and was so much relieved by the change, he accepted the next year the invitation of Sir Francis and his lady to take up his residence with them, retaining chambers only in town. By arrangement he had his own apartments at the Manor House, for which he contributed his share of expenses without difficulty—he was worth about £45,000—and found in every sense of the word a home of rest. The record of his life here, as told by Lady Masham and by his own correspondence,

is delightful reading. Immortal Isaac Newton, not always as amiable as immortal, was a rather frequent guest, with others whom he chose for association. He lived on in this charmed place until 1704, feeble and latterly deaf, but always in good spirits. He exercised still his medical art on the family around him and on himself, relieving a palpitation to which he was subjected by having taken from him a few ounces of blood. His final illness, leading to death, was lingering. A special carriage was constructed for him, in which he took easy drives, and when this exercise became too tiring, he was carried into the garden in an easy-chair. At a later stage he was borne from room to room. He wrote his last letter to Peter King, the bridegroom of the wedding feast, on October 4th, 1704. He was too weak to write much, but his mind was clear, and he arranged his affairs quietly, leaving the bulk of his fortune to the youngest son of Sir Francis and only son of Lady Masham, who had been as careful to please and observe him as if he had been his own son. So step by step he wiled his way into the eternities about three of the clock on October the 26th, 1704.

By his own request, he was buried, without any trappings to his coffin, on the south side—for he loved the warmth of the sun—of the church at High Laver, where still his remains lie, in a raised brick-walled grave, close to the church wall, surrounded by iron railings and surmounted by a rather large tablet fixed in the wall of the edifice, and bearing beneath his coat-of-arms a Latin epitaph, written, all except the date of his death, by himself. The epitaph bids the traveller stay : *Siste viator* ; it tells that near by lies John Locke. If you ask what manner of man he was, the response is, "One contented with his modest fate. Brought up as a scholar, he employed his studies to devote himself to truth alone. This learn from his writings, which will tell what is to be said about him more faithfully than the questionable eulogies of an epitaph. His virtues, if he had any (*Virtutes si quas habuit*), were too slight for him to offer them for his own credit, or as an example to you. Let his vices be buried with him (*Vitia una sepeliantur*). Of good life you have an example, would you seek it, in the Gospel ; of vices would there were none for you to seek ! Of mortality, certainly (may you profit by it), you have one here and everywhere. That he was born on August 29th in the year of our Lord 1632, and that he died on October 28th, 1704, this tablet, which itself will quickly perish, is a record."

The tablet has not yet perished. In 1882 I entered the birth-
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room of Locke at Wrington, a room in the cottage I have described in my opening sentences.* On July 22nd of this year (1893), accompanied by my good friend Mr. Westray, I visited High Laver, and sought for all that could be heard traditionally of our philosopher. So little remained of tradition that our hostess at an inn not far away, who had had a bust of Locke on her staircase for twenty years, did not know the name of the man it represented. The Manor House at Oates was gone, although the site of it was recognisable, and almost without the aid of imagination the paths over which the two immortal bachelors, Isaac Newton and John Locke, took their walks and talked their talk were traceable. In the little churchyard the tombs of the Masham family were found falling fast into decay ; but the tomb of Locke was in good repair, and, bathed in the golden light of a setting sun, looked quite fresh and sound. One thing only is wanted, Mr. Gingell, of High Laver, who was so good as to act as our guide, told us, and that is a plate to be affixed to the railings of the tomb supplying plain people who visit the spot an English translation of the epitaph.

* I am indebted to the kindness of Mrs. M. Monica Wills, of Barley Wood, Wrington (long the residence of Hannah More), for the information that the cottage in which Locke was born is now pulled down.

The Honourable Robert Boyle, F.R.S.

“**M**R. BOYLE, the ornament of his age and country, succeeded to the genius and inquiries of the great Chancellor Verulam. Which of all Mr. Boyle’s writings shall I recommend? All of them. To him we owe the secrets of fire, air, water, animals, vegetables, fossils, so that from his works may be deduced the whole system of natural knowledge.”

This tribute to the genius of Robert Boyle, who was born the same year as the great Chancellor Verulam died, was paid to him by Boerhaave, and served as a kind of supplement to what had been said of him in a funeral discourse by the celebrated Gilbert Burnet, Bishop of Salisbury, who, speaking of Boyle as a philosopher, declared, “His design was only to find out nature, to see into what principles things might be resolved, of what they were compounded, and to prepare good medicaments for the bodies of men. He spent neither time nor fortune upon the pursuits of high promises and pretensions; he always kept himself within the compass that his estate might well bear; and as he made chemistry much the better for his dealing with it, so he never made himself the worse or the poorer for it. It was a charity to others as well as an entertainment to himself; for the produce of it was distributed by his sister and others, into whose hands he put it.”

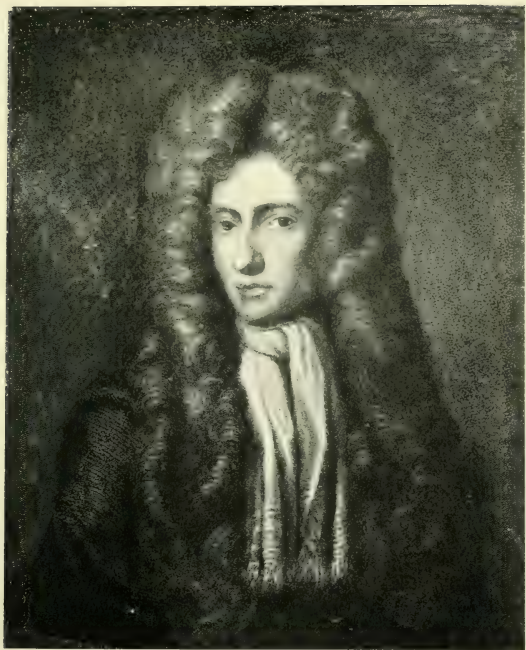
In plain words, Boyle was one of the most fortunate of the fortunate men of science. Labours in scientific research were not wanted to give him station, for he was born to a station which no mere man of science could fully acquire, whatever he might do to deserve it. He had means at command sufficient for all his experimental necessities; and he had the privilege of descending with the advantages both of science and of nobility for a birthright, the happiest of combinations that could fall to a philosopher inquiring

into natural things. *Felix qui potuit rerum cognoscere causas*, never was better exemplified than in his life and career.

The father of Boyle, Richard Boyle, favoured by fortune and still more by his own efforts, became Earl of Cork, and in time was still better known as the "great Earl of Cork," whom the king, Charles I., credited with having, as governor of the province of Munster, in Ireland, shown himself "to be a person of great abilities in building towns, and fortifying them with fair walls and towers, and filling them with English colonies, building churches, and reducing the people to civil obedience; in establishing religion, extirpating superstition, defending the passes of the country with castles, building many bridges for the convenience of the public, guarding the ports and maritime places of the province against foreign enemies; in first introducing manufactures and mechanic arts into the province and afterwards establishing them by guilds and fraternities of artificers, to the plentiful increase of riches and civility; and all this at his own expense and by his own industry."

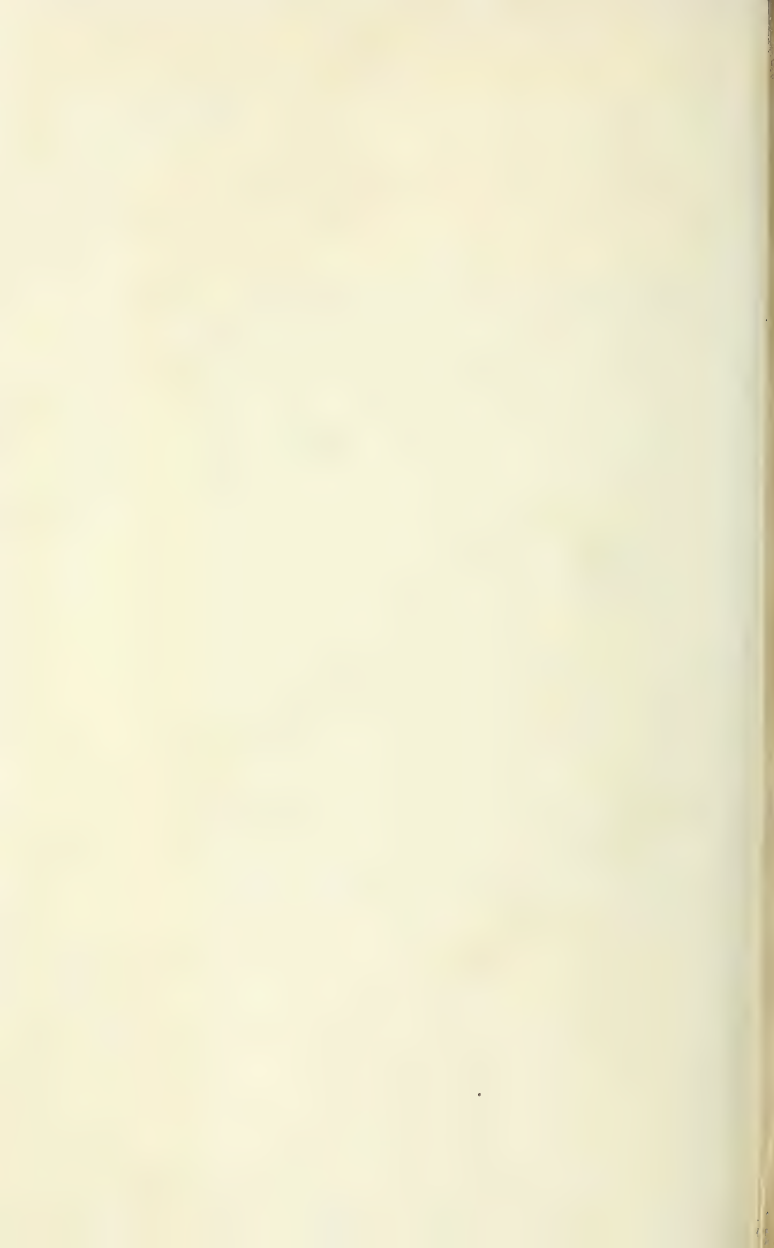
The wife of this earl was Catherine, daughter of Sir George Fenton, principal secretary of state, and a mother of such excellent nature that her husband, who was knighted on their wedding day, said of her, "I never demanded any marriage portion with her, neither promise of any, it not being in my considerations; yet her father after my marriage gave me one thousand pounds in gold with her. But that gift of his daughter to me I must ever thankfully acknowledge as the crown of all my blessings; for she was a most religious, virtuous, loving, and obedient wife to me all the days of her life, and the mother of all my hopeful children."

Such was the happy and immediate pedigree of Robert Boyle, who, the seventh son and fourteenth child of this union, was born at Lismore, in the province of Munster, on January 25th, 1627. For natural nursing he was put under the care of a country-woman, who was instructed to treat him as if he were her own child, his father having, as he said, "a perfect aversion for the fondness of those parents who breed their children so nice and tenderly that a hot sun or a good shower of rain as much endangers them as if they were made of butter or of sugar." It does not, however, appear that Robert Boyle was favoured by the parental resolution. He was by nature of a gentle and, we may almost say, fragile constitution, and was rather unfortunate in his first years. He lost his mother when he was three years old; he mocked some children or playfellows who stuttered, and so completely caught their peculiar habit that he



Ro. Boyle

From an engraving by R. Woodman, after a painting by Kersseboom.



was never cured of it, though every endeavour was made in that direction ; lastly, while a child he was subjected to an extreme nervous shock by being thrown in a coach into a flowing stream, to be rescued by one of his father's gentlemen.

In his father's house at Lismore Boyle received his first lessons, the chaplain of the house teaching him writing and arithmetic, and a French gentleman resident there instructing him in languages. This tuition continued until his eighth year, when he was sent to England, in order, under the direction of Sir Henry Wotton, to be educated at Eton. Here he imbibed, according to his statement, a taste for other than pedantic books from accidentally reading the story of Quintus Curtius, to whom he owed more than Alexander did, and derived greater advantages from the history of that great monarch's conquests than ever the monarch did from the conquests themselves.

At Eton, again, he was subject to one or two physical accidents, but remained there nearly four years, and was then taken by his father to their seat at Stalbridge, where he was placed under the care of a clergyman of Stalbridge, who acted as chaplain to the family. In 1638 he moved with his father to London, residing at the Savoy and continuing his studies until his brother Francis married Mrs. Elizabeth Killigrew, after which event he and Francis started off on the grand tour, according to the fashion of the day, accompanied by a guide and tutor, Mr. Marcombes. At that time the old town of Rye, in Sussex, was a place of embarkation for packets sailing for France, and from Rye they passed over to Dieppe, thence to Rouen, Paris, Lyons, and Geneva, stopping at the last-named place in the house of their tutor, for student work. Boyle while here pursued the study of mathematics, which he had commenced at Eton in a kind of retirement from the perusal of romantic books supplied to him while recovering from ague. He did not, however, devote all his time to study ; he rambled about a great deal, travelled in Savoy, and reached Grenoble, in the Dauphine province. He seems at this period of his young life to have been bitten of melancholy, "the devil taking," he tells us, "advantage of it" ; and the strange stories and pictures he formed of Bruno, the founder of the Carthusian monks, "suggested such curious, hideous, and distracting doubts of some of the fundamentals of Christianity that, though his looks did little betray his thoughts, nothing but the forbidness of self-despatch hindered his acting it." The melancholy, bordering evidently on suicide, acted upon him for many months, and led him, after he got out of it, into an inquiry as to the foundations of the Christian

religion. By this means he became confirmed in his belief, "although," to use his own words, "the fleeting clouds of doubt and disbelief did never after cease now and then to darken the serenity of his quiet, which made him often say that injections of this nature were such a disease to his faith as the toothache is to the body, for, though it be not mortal, it is very troublesome."

Quitting Geneva, Boyle proceeded to Italy, and wintered in Florence, where he picked up the Italian tongue and worked very sedulously at Italian literature, especially that of a scientific kind. He was much influenced by the writings of Galileo, and it was while in Florence that Galileo himself, by this time deaf, hypochondriacal, and rheumatal, terminated his eventful and sad, yet beautiful, life in a residence near to the city. It does not seem, however, that the young and the old philosopher ever met. From Florence, after a rather long sojourn, he proceeded to Rome, having sighted the Carnival, which he looked upon as a species of lunacy, saw the Pope (Urban VIII.) at chapel, and made many explorations into places surrounding the Holy City. Remaining in Italy until 1642, he began to make his way Englandwards, receiving on his journey mournful news from his father respecting the rebellion in Ireland, and finding, when he reached his native shores in 1644, that his father was dead, and he himself the owner of Stalbridge, of estates in Ireland, and of considerable wealth in money. From henceforth he was independent; and, great as was his enthusiasm for research, and free as he was with money for that noble end, he never exceeded his income, and never in any excess or frivolity set aside the claims of the sciences he most loved. Even his chaste love for one fair lady he conquered, and to the end of his days remained a bachelor.

On his settlement in England he first retired to Stalbridge, and all through the troublous times of the Civil War, in which he took no active part, he remained a student, now in London in the house of his sister, the Viscountess Ranelagh, in Pall Mall, then in Oxford, and for a short time in Holland. During this period, so memorable in the history of our country, he became a central figure in a society which met in London or Oxford under the name of the Philosophical College. The members of the college held their meetings in the quietest, if not most secret, manner, and he aided the learned body to hold together until after the Restoration, when they became the famous Royal Society, the home ever since of all that is most useful and most famous in English science.

A very young man when he came into his patrimony, Boyle

quickly sobered down into a calm, philosophic frame of mind ; so that, in truth, it seems as if he never had a youthful time or prime. He was the friend and companion and fellow-labourer of men who were his seniors from the first. He followed no profession ; and although the Church for a time tempted him, he felt he could not, in conscience, give himself to the vocation ; yet he wrote works which would have distinguished a professed cleric as a theologian. He did not become a chemist in the strict sense of the term ; yet he made many chemical discoveries, or helped to make them. He did not court medicine as a professor or practitioner ; yet he was so fond of medical art and, indeed, of medical research, he fairly comes under the title of medical philosopher.

MEDICAL WORKS OF BOYLE.

In the space at my command I must refer only to those labours of our philosopher which have a bearing more or less direct on medical subjects. A catalogue of his complete works would fill many pages. Birch's *Life and Collectanea* of Boyle includes five ponderous volumes in double columns, each volume extending to nearly six hundred pages. Out of these we are specially concerned with the following essays : (a) *Experiments physico-mechanical touching the spring of the air and its effects and touching the weight of the air* ; (b) *Certain Physiological essays* ; (c) *The usefulness of natural philosophy to physic* ; (d) *Particulars relating to the pathological part of physic* ; (e) *Particulars relating to the semeiotical part of physic* ; (f) *Some things relating to the hygienical part of physic* ; (g) *Particulars wherein natural philosophy may be useful to the therapeutical part of physic* ; (h) *New experiments and observations touching cold* ; (i) *New thermometrical experiments and thoughts* ; (j) "*Observables*" upon a monstrous head ; some anatomical observations of milk found in veins instead of blood, and of grass found in the windpipes of certain animals ; (k) *The method observed of transfusing the blood of one animal into another* ; (l) *Trials proposed to Dr. Lower to be made by him for the improvement of transfusing blood out of one live animal into another* ; (m) *A confirmation of the experiments made by Signor Fracassati in Italy by injecting acid liquors into the blood* ; (n) *New experiments concerning the relation between light and air in shining wood and fish* ; (o) *New pneumatical experiments about respiration* ; (p) *New experiment about the relation between air and the flamma vitalis of animals* ; (q) *An attempt to produce living*

creatures in vacuo Boyleano ; (r) *An account of the two sorts of the Helmontium laudanum* ; (s) *Memoirs for the natural history of the human blood, especially the spirit of that liquor* ; (t) *Observed causes of the insalubrity and salubrity of the air and their effects* ; (u) *Medicina hydrostatica, or hydrostatics applied to the materia medica* ; (v) *Duty of a mother to nurse her own child* ; (w) *Chemistry: its usefulness to human life, to trades, etc., and chemico-medical chaos* ; (x) *Of poisons and of turning them into antidotes* ; (y) *A practical essay about vitiated sight, and an invitation to physicians to make use of simple medicines* ; (z) *A chemical and mechanical examen of materia medica*.

We discover in this remarkable alphabet a little library of medical philosophy. In some instances matters in their origin are unfolded ; in other instances the subject is glanced at rather than expounded ; and, in a third set, nothing is really effected from which any value has been derived up to the present time. Out of the alphabet that has been presented, however, there is much to learn, and to some of the heads of it I proceed briefly to invite attention.

Spring and Weight of the Air.

The essay of Mr. Boyle on the spring and weight of the air was addressed in the form of a letter to "Lord Dungarvan, his honoured and dear nephew," then (1659) residing in Paris. The communication, extending really into a volume, is the narrative of a most careful series of experiments, in which he showed that the air had weight ; that by its weight, through an atmosphere which extended above us perhaps fifty miles, it compressed its lower parts, in which we live, thereby condensing itself ; that it pressed equally on all bodies in all directions ; and that, as in the Torricellian vacuum experiments, it admitted of being renewed or exhausted from glass receivers, according to the method invented by Otto Gericke, in the engine to which the name of "air-pump" was subsequently given, an engine which Dr. Hook aided greatly to simplify. All the experiments read to this day fresh and clear, but those which are most curious to the medical mind relate to respiration which, until they were performed, was a chaotic mystery. In order to see what part the air played in the act of life, Mr. Boyle placed flying insects in a globe that could be exhausted more or less of its contained air. He found that when the air was exhausted the insects fell. He replaced the insects by small birds, then by mice ; and in time he found that the animals died from the circumstance that they could not exist unless they had

a given quantity of air on which to subsist. *In vacuo* they became convulsed and ceased to breathe. The phenomena induced might, he thought, admit of being accounted for by the expansion of the blood within the vessels of the animals, as if the blood boiled in them and, as it were, underwent explosion. Later he came to a nearer conclusion—namely, that the failure of respiration took place and led to the fatal results because there “is some use of the air, which we do not yet so well understand, that makes it so continually needful to the life of animals. *Paracelsus indeed tells us,*” he continues, “*that as the stomach concocts meat and makes part of it useful to the body, rejecting the other part,* so the lungs consume part of the air and *proscribe the rest.* So that, according to our hermetic philosopher, it seems we may suppose that there is in the air a little vital quintessence (if I may so call it) which serves to the refreshment and restoration of our vital spirits, for which use the grosser and incomparably greater part of the air being unserviceable, it need not seem strange that an animal stands in need of almost incessantly drawing in fresh air.” Until I became familiar with the works of Boyle I was not conversant with the fact that Paracelsus had so ably anticipated the discovery of oxygen. It is clear that from him Boyle had all but seen the secret of oxygen, and what is more curious still, he had knowledge of an experiment of “a famous mechanician and chemist, Cornelius Drebell,” who made for King James a vessel to go under water, the trial of which, “with admired success,” was conducted in the Thames, the vessel carrying twelve rowers, besides passengers. How this was done he also explains, as he heard from the relatives of the experimentalist. Drebell conceived that it is not the whole body of the air, but a certain quintessence or spirituous part of it, that makes it fit for respiration, which being spent, the remaining grosser body or carcase (if we may so term it) of the air is unable to cherish the vital fire in the heart. Drebell, therefore, besides the mechanical contrivance of his vessel, had, says Boyle, a chemical liquor which he would from time to time allow to give off vapours that would relieve the troubled respiration of the confined persons, either by restoring to the air some of its vital parts, or by dissipating or precipitating the grosser exhalations. What this liquid was, Drebell held secret, to his own great loss in historical fame and honour.

To Boyle this invention, whether it were a discovery or a trick, seemed to start many and new thoughts, which led him to soundest of sound experiments that to this day live. He learned by experiment that the air supported flame, that flame would cease when air was

withdrawn ; he compared the flame of a candle to the flame of life ; and he began to wonder from what source fishes could obtain the vital spirit. He speculated how the foetus could live *in utero*, and he gathered together many facts relating to the length of time famous divers and others could exist under water, recording the instance of a corpulent man who could descend to the bottom of the Thames, and bring out of deep holes at the bottom of the banks "large fishes alive in his hands." Lastly, he drew from his experiments the fact that insects in a reservoir from which air was excluded were rendered temporarily dead, but being exposed to air again, revived, and were restored to all the functions of life.

I would like to follow further many of Mr. Boyle's researches in this essay, and specially those which relate to the spring and weight of the air and to rarefaction ; but it is necessary to pass on to the next topic that most concerns us in our vocation as healers.

Natural Philosophy and Physic.

His essay on the usefulness of natural philosophy to physic is remarkable. He tells us that in his day medicine was divided into five parts : (1) the physiological ; (2) the pathological ; (3) the semeiotical ; (4) the hygienical ; and (5) the therapeutical. We scarcely could divide better in these days, and it is in relation to each of these divisions that he endeavours to show the usefulness of philosophy. He follows Aristotle in saying that the naturalist ends where medicine begins, and medicine begins where the naturalist ends. Under physiology he gives us much information we should scarcely have expected him to have had. He relates instances where the spleen has been extirpated without any apparent injury to life ; he tells us that the frog will live and move for a long time, as if not injured, when the heart has been removed from the body ; that the viper will move for a long time and appear to live when the head, heart, and intestine have been removed ; that the silkworm butterfly is capable of procreation after the loss of its head ; and that portions of muscular substance could be digested by the action of acid menstruums (derived from vitriol) in some similar manner to the digestion that occurs in the stomach.

In the pathological part of this discourse he is not so full as in the physiological ; yet he recognises the value of pathological research, makes many useful observations on the character and mode of construction of the calculi of the bladder and gall-duct, on fermentations

as causes of febrile states, on transfusions into the veins, and on the effects of various poisons absorbed into the body by the veins, the capillaries, or the digestive canal. The part bearing on semeiotical studies is also poor, nor can I find anything in the hygienic section that calls for praise ; but of the therapeutical more may be declared, if little in these days can be learned from it. The author's remedies, including urine as one of them, would be a subject for contempt to us moderns ; but some facts, as, for instance, the use of galls as a styptic, of arsenic, and of bismuth, call still for our attention. Perhaps the best notes refer to the effects of the mind on the body, and of bare motions or active impulses of external bodies in their actions on animal bodies. He tells us what great and dangerous sufferings he has himself endured in sea-sickness, which disease is caused by external impulse or motion entirely, without any fermentative change in the body itself. Motion is here the cause ; rest from motion is the cure. Thus a clue is supplied for the treatment of many diseases by rest alone. On the other hand, there are some diseases arising from poisonous influences acting on the body, which are, or seem to be, curable by the aid of external vibrations. The biting of that "poisonous spider" the tarantula leads to a lasting and formidable disease, which, mocking all other remedies, is by nothing so successfully opposed as by music. He speaks likewise with much commendation of the acid fumes of sulphur, administered by inhalation, in cases of consumption of the lungs.

Touching Cold.

A section, very prolonged, on the *Experimental History of Cold* is an almost forgotten work of supremest interest and importance. It is in our time just as curious as it must have been in that of the author. Especially is it curious to the psychologist and physician. In one part Boyle describes how persons exposed to fatal degrees of cold are sometimes killed, and how the fatal effect is brought about by one of two methods. There are some who die an immediate and painless death. They become slowly benumbed and drowsy, and if they are not roused to exercise, die in torpor or sleep. There are others—and this applies particularly to soldiers who ride on horses and carry armour on their bodies—who are first affected in their kidneys and intestines. They are stricken with pain in these parts, and when they are relieved from exposure they are maddened with the suffering they experience in

the abdomen. They are unable to swallow anything without the occurrence of vomiting, and they sink into death with continued griping and cramps, from which there seems to be no relief. After death in these last-named instances the intestines are found to be agglutinated.

The effect of extreme cold in preserving dead animal tissues from decomposition is made much of, and it is certain that if Boyle's observations had been attended to we should not have been obliged to wait two hundred years or more for the introduction of the method of transporting frozen animals from one part of the planet to the other. He knew right well those experiments which show that some living animals, like fish and frogs, entrapped suddenly by cold in freezing water, may be congealed by cold quite through their bodies, and taken out of their imprisonment to all appearances dead, may, under careful thawing, revive and live again. He was inclined to believe that swallows may exhibit the same phenomena; but was not sure on this point—a reserve which was well worthy of his acute learning. The swallows congealed by the side of frozen rivers might, he suspected, never have been frozen through, but, merely held in a state of torpor or hybernation, had risen from nothing more than a kind of deep sleep. This would accord with some of my own experiments, in which torpor produced in birds rendered them for the time apparently dead, but proceeded no further than torpor, the beat of the heart being detectable during the whole period. This also would agree with the now well-known fact that, whereas the natural temperature of the fish and the batrachian is lower by several degrees than that of man, the temperature of the bird is several degrees higher, so that between a fish and a bird there may be a difference of as many as thirty degrees on Fahrenheit's scale.

Lastly, Boyle determined some effects of extreme cold on dead animal tissues and fluids. He produced congelation of the eyeballs of dead oxen and sheep, observed that the lenses were made to adhere, noticed that the diaphanous quality of the lenses was lost, and detected that in the process of thawing the water glassy humours seemed to be made of flakes. Further he froze blood drawn from a sheep, and registered in his journal that the blood froze at the top and on all the sides of the dish, and that this ice being separated and thawed at the fire, and again exposed, congealed (coagulated) into a seeming membranous substance, and so continued.

A Monstrous Head ; Spirit for Preservation.

A short paper entitled *Observables on a Monstrous Head* is of some importance in itself. It tells simply: first, that he saw the head of a colt that had no sign of any nose, unless a double bag that grew out of the midst of the forehead were some rudiment of it; next, that the two eyes were united into one double eye, which was placed in the middle of the brow, whereby the two eyeholes in the skull were united into one very large hole, into the midst of which from the brain entered one pretty large optic nerve, at the end of which grew the large double eye, the sclerotic membrane which contained both being one and the same, but appearing to have a seam, by which they were joined quite round it, the fore or pellucid part distinctly separated into two corneas by a white seam that divided them, each cornea seeming to have its iris and pupil distinct; also upon opening the cornea there were found two crystalline humours, very well shaped. There were four eyebrows.

To this paper there is attached as a novelty the remark that Boyle, in order to preserve this specimen, had it put into a vessel and covered with spirit of wine. It is claimed that such mode of preservation was invented by Boyle so that the parts of animals and monsters could be preserved long enough even in summer to afford anatomists the opportunity of examining them.

White Blood in the Veins.

A curious person wrote from Paris that on opening the vein of a man in the house of a physician there, milk instead of blood flowed. This information being imparted to Mr. Boyle, he replied that the same phenomenon had been observed by a learned physician of his acquaintance. The physician in question was the famous Dr. Richard Lower, to whom I shall have to refer a little later on. The observation of Lower was made on a girl from whom blood was let from the foot. The first blood on being caught was seen to be very white; and the last, caught separately in a saucer, turned white immediately "like the white of a custard." Five or six hours afterwards Lower chanced to see both bloods. The first was half blood and half chyle swimming upon the blood like serum, white as milk; the second, in the saucer, was all chyle, without the appearance of one drop of blood. When both specimens were heated distinctly over a gentle fire, they hardened, as the white

of an egg does when it is heated, or "just as the serum of blood does with heating, but far more white." "This maid," it is added, "was then in good health, and was only let blood because she never had her courses, yet was she of a very florid and clear complexion." The blood was let about eleven o'clock in the morning, after a good breakfast partaken of at seven, four hours previously.

These, I believe, are the first clinical observations of chylous blood ever recorded. They were sent to the Royal Society, and were printed in the *Philosophical Transactions*, No. VI., p. 117.

Transfusion.

In the *Philosophical Transactions*, No. XX., p. 353, Boyle publishes a clear account of the early practice of transfusion. He was not, as I have elsewhere shown, the first in this field of discovery, but he was one of the first who reported on the practice of the art of transfusion. Libavius comes first as the expositor; Dr. Richard Lower comes first as the practitioner. From Lower Boyle was inspired; and seeing, as he believed, great advantages from the process, he proposed its further application, suggesting "to exchange the blood of old and young, sick and healthy, hot and cold, fierce and fearful, tame and wild animals, and that not only of the same, but also of different, kinds." It is worthy of notice that in the practice of transfusion in the lower animals—for he did not make any trials on man or woman—he transfused arterial blood from one animal into the venous system of another animal. He transfused, as a rule, the blood spirting from a carotid artery into the descending part of a jugular vein, leaving the upper part of the vein free, so that the arterial blood, making its way over all the venous system, replaced what was being lost from the open vein. In some instances he seems to have bled three or four animals into one animal, and he adds that the most probable lesson of this experiment may be conjectured to be that one animal may live on the blood of another; and, consequently, those animals that want blood or have corrupt blood may be supplied from others with a sufficient quantity and with such as is good, provided the transfusion be often repeated, by reason of the quicker expense that is made of the blood. In his experiments quills were used as the injecting tubes—sometimes quills with fine metallic endings—which were tied into the divided vessels.

The importance attached by Boyle to transfusion is fully conveyed in a series of suggestions which he addressed to Dr. Lower for further experiment. These are sixteen in number, and abound in thoughts of the most curious character. Would transfusion change the disposition of individual animals of the same kind? Would it change the affections? Would the blood of a mastiff frequently transfused into that of a greyhound or a spaniel prejudice the sense of scent? Would acquired habits be destroyed or impaired by the experiment? Would any considerable change occur in the pulse, urine, and other excrements of the recipient animals after the operation? Whether a well-fed animal yielding its blood to feed a starving animal with its blood would confer loss of appetite; and, whether the blood of the recipient would contain chyle derived from the "emittent"? Whether an animal could be kept alive without eating by the frequent injection of the chyle of another? Whether an animal sick of some disease imputable to the mass of blood may be cured by exchanging it for that of another; and whether a sound animal may receive such diseases as are not infectious from the blood of a sick one? What would be the effect of frequently stocking an old and feeble animal—a dog—with the blood of young ones, as regards dulness, drowsiness, and *vice versâ*? Whether a small young dog, by being often fresh-stocked with the blood of a young dog of a larger kind, will grow bigger than the ordinary size of its own kind? Whether any medicated liquors may be injected together with the blood? Whether if a purgative medicine be given to the emittent animal, the recipient will be purged, and how? Whether transfusion may be successfully practised from the blood of an animal of one species into that of another species: that of a calf into a dog, or of a cold-blooded into a warm-blooded animal? Whether the colour of the hair or feathers of a recipient animal will, by repeated operation, be changed into that of the emittent? Whether by frequently transfusing into the same animal the blood of some animal of a different species, something further, and tending to a change of species, may be effected, at least in animals near of kin? Whether transfusion may be practised on pregnant animals, and what effect it will have on their young?

The process of transfusion of blood from one animal into another soon found its limitation. It fell into an obscurity which it did not deserve, out of which even in this day it has not emerged. Boyle was enthusiastic on the subject, and it would appear that he penetrated in thought some centuries in regard to it. He also was led by it to experiment on the coagulation of blood; and referring to

Signor Fracassati's attempt to inject acid liquors into the blood, he shows that acids like aquafortis, hydrochloric and sulphuric, cause coagulation, while alkalies, especially the volatile alkali, added to warm blood, not only keep it fluid, but suspend its putrefaction. Altogether, in these matters of transfusion and coagulation of blood, Boyle made distinct advances, for which he deserves our grateful remembrance.

Pneumatical Experiments about Respiration.

I must pass over the experiments on the relation between light and air in shining wood and fish, in which, to a large extent, he anticipates the theory of eremacausis, in order to proceed to the more purely medical study, and so I am brought to the work of this master in pneumatical experiments which have reference to respiration. Up to his day it was not fully understood that a constant supply of air inspired and expired was essential for the continuance of life. He proved the fact, by the use of the air-pump, so clearly that the point was never seriously contested afterwards; he proved it also by his observations on men who were accustomed to dive under water, showing that the best of them were unable to live submerged for more than two or three minutes. He also paid much attention to the vexed question how the air is drawn into and expelled from the lungs. He did not take into account the elastic tissue of the lungs, but he gave to the diaphragm its proper function; and, contrary to the common view that by some process air is forced into the lungs as it might be into a bladder, he maintained that it is drawn in and forced out as it would be in the working of a bellows. He was, at the same time, observant of two or three other facts which threw new light on respiration. He was aware that in expiration water vapour was systematically exhaled in very considerable quantity, and that in addition there was some other excrementitious substance, as gas or vapour, that commingled with the vapour of water. Thirdly, he noted that when an animal was confined under a jar or in a limited space it lost in bulk, or, as he explained it in his mechanical way, it lost its "spring."

To Boyle the credit must be given of having been the first to observe that blood and milk, and vascular organs like the liver, contain gaseous or vaporous matter in them which can be extracted by the air-pump. He caused astonishment to some onlookers by saying that the fresh blood of a lamb, that had been held fluid by removal of its fibrine, seemed to boil over the sides of the vessel

containing it when placed under the bell of the air-pump, from which the air was being extracted.

He carried also his researches to minute forms of animals such as mites, and saw that they died when they were deprived of air, but that afterwards, being left exposed to air, they revived. He placed a fish in a globe or vessel in the receiver of the pump, and exhausting the air, noticed that many bubbles of air rose from the body of the animal, and that at last it seemed to lose indications of life, from which collapsed state it recovered after it had been put into a basin of pure and fresh water. Strange to say, in spite of this reading from the book of nature, he did not grasp the fact that fish live by breathing air from water, and respire and expire by the gills, as warm bloods do by the lungs: so often may the acutest minds miss the most obvious truths when only half a problem remains unsealed. He knew that there was air in water, he knew that a fish breathed in water and lived, he knew that an animal existing in air lived by the renewal of air, and he knew that the economy of the two sets of animals was virtually the same; yet he missed the connection between the air of water and the lungs or gills of fish. The oversight seems incredible; yet it is not more incredible, I warrant, than a thousand equally plain natural processes we are observing daily now and do not realise the meaning of, however simple they may be.

Flamma Vitalis.

One of the most original chapters of an experimental character in the works of Boyle is that which he dignifies as the *flamma vitalis*. He was impressed with the physical not less than the poetical idea that life was a flame, and he was led to the physical experiment of testing how far the idea accorded with the fact. He placed small animals, birds, and mice in closed jars, in which a spirit lamp also burned, and he found what we now know happens: that the burning lamp begins to fade and die long before the lamp of life goes out. He tried the same experiment in a receiver from which the air could be extracted by the air-pump; and again he discovered that the *flamma vitalis* outlived the flame of the spirit lamp and of a candle and taper that were substituted for the lamp. He ignited a bit of charcoal, and let it smoulder in the receiver in company with a small bird, and once more noted that the living fire went out first when air was withdrawn, and that the bird became sick, but on being readmitted to fresh air made a very good recovery. Over these

phenomena he was much puzzled, not knowing, with full knowledge, of the deadly gas which is emitted from burning charcoal; but in the end offering a most shrewd guess at the truth that "common flame, making a great waste of the aërial substance, cannot so easily as the other find matter to prey upon, and so expires while there yet remains enough to keep alive the more temperate vital flame."

Touching the vital fire and light, Boyle carried out a series of experiments on glow-worms, and on their light-giving material, by putting them or portions of them into the receiver of the air pump and exhausting some air from them. When the air was removed he saw the light disappear, and on letting in air again saw it reappear more refulgent than before. He tried the experiment, too, with a dead and a living glow-worm under the same receiver, and found the same result: loss of flame when the air was withdrawn and return of the luminosity when the air was re-supplied. But the luminous part of the dead worm was much larger than that of the living, and the light of the dead one appeared of a greenish blue, whereas that of the living appeared of a whitish yellow.

Another point of deep interest was settled by Boyle. It had been conceived up to his time that an animal weighed more immediately after than immediately before its death. He tested the fact on a mouse and on a kitten, and learned that the reverse was the fact. Both animals after death showed loss of weight; the kitten, which in life weighed between ten and eleven ounces, having lost by death four grains.

Finally, under this head Boyle tried if silkworm eggs under proper warmth would hatch *in vacuo*, or whether, in the process of hatching, air were required. The experiment was not so carefully watched as others were, and some apologies were made for that circumstance; the conclusion, however, was arrived at that air was again a necessity, and that the vital flame could not be set going in its absence.

I would I could find space for parts of some essays *on effluvioms; on some hidden qualities of air; on the corpuscular or mechanical philosophy; on attraction by suction; on potential coldness; on the mechanical production of odours; on the hypothesis of alkali and acidum; on the mechanical origin or production of electricity; and on the absorption of air by metals, with increase of weight.* In each of these essays we should find food even for modern science; but they must be allowed to pass, so that in the few remaining pages at command those things that are most to our purpose may pass before our minds.

The Human Blood.

I skip over the recipe for making what was called *Helmontium laudanum*, a medicine invented by the son of Baron von Helmont—and which was, in fact, nothing more than opium digested with quince and saffron—in order to treat on the great essay on the *Natural History of Human Blood*. In the investigation on which the essay is founded we are led to the study of the following subjects: the colour; the taste; the odour; the heat; the inflammability; the aërial particles; the specific gravity of the red and fibrous parts of the blood, and of the serous part; the consistency; the disposition to concretion and the time wherein it is performed; the liquors and salts that coagulate and those that impede or dissolve the coagulation; the liquors, etc., that preserve blood; the liquors that blood may admit from aliments; the spontaneous or natural analysis into a serous or a fibrous part; the quantities of the serous and fibrous parts; the differences between the serous and the red parts; the analysis of blood and fruit of its spirit; the volatile salt of blood and its figures; the phlegm of distilled human blood; the two oils; the fixed salt; the *terra damnata*; the proportion of the differing substances chemically obtained from blood; the fermentation and putrefaction of blood and its phenomena; the mechanical uses of blood, as in husbandry; the chemical uses; the medicinal uses; the difference between human blood as it is found in persons differently constituted and circumstanced, as men, women when menstruous and when not, children, Moors, etc.; and the affinity and difference between the blood of men and that of divers animals, as quadrupeds, birds, fishes, and sanguineous insects.

It is singular to us now living to note how readily Mr. Boyle obtained human blood for his inquiries. Bleeding was so common a process in his day that he had only to go to the surgeons' shops to obtain fresh blood from the subject, as we might now go to a hairdresser's to obtain specimens of beard or of hair. He seems to have been quite unobservant of any risk or danger from the all but universal practice of blood-letting. The facility of obtaining the blood under these circumstances rendered his experiments easy. Let me name a few of the conclusions at which he arrived.

He endeavoured to ascertain the specific gravity of the blood, taking water as the standard, and assumed it to be heavier by about the twenty-fifth part of its own weight. He was most particular in his inquiries on what he named the "spirit" of the blood, a substance

he obtained by distillation together with a volatile salt. The spirit was obtained by distillation of blood drawn from persons that "parted with it out of custom," sick persons being unfit for his purpose. The spirit, so called, was possibly ammonia in solution of water, a fact he himself came to believe, since he queries whether the volatile salt is anything more than the spirit in a dry form. There is, at the same time, some difficulty in knowing what the liquid really was. He does not give us sufficient details as to the mode of distillation, and he informs us that the spirit was odourless, tasteless, colourless, and transparent, a description that in regard to odour and taste does not tally with ammonia. It was alkaline, had strong powers of dissolution, made copper of a beautiful azure colour, dissolved zinc easily, and rendered dark blood clot florid, like a fine scarlet. It neutralised acids in some instances, as with lemon juice, causing effervescence, and it acted as a splendid preservative of animal tissues. The great point on which he dwelt in respect to the spirit of blood was its medicinal virtue, both externally applied and internally administered. He presumed it to be a rational remedy in hysteria, pleurisy, coughs, epilepsy, apoplexy, jaundice, and many other diseases, including even confirmed phthisis.

So much for what can be said here about the natural history of the human blood. Microscopical observations there are none of moment, chemical and physical any number—some good, some worthless, all original. One other observation must not be omitted. Boyle found that the urine of a man made a good invisible ink, and thinking of the analogy between urine and the serum of the blood, he traced with serum held in a pen some characters on a white piece of paper, and having suffered them to dry on, he held the unwritten side of the paper to dry over the flame of a candle, by which means the letters appeared, though not of an inky blackness, of a colour dark enough to be easily legible.

Medicinal Experiments.

Under the head of medicinal experiments, or a collection of choice and safe remedies, Boyle gives a number of recipes at some of which we cannot but smile. He states very modestly that medicine is not his profession, but he hopes his collection will not incur the displeasure of charitable persons, even though they be physicians. Some of the recipes are nothing more nor less than disgusting, although quite in accord with the practice of the day. Some are

useful. For staunching of blood he prescribes dried lycoperdon ; for hæmorrhoids he recommends application of balsam of sulphur made with turpentine ; for a sprain he orders wheat bran saturated with the strongest vinegar to be applied to the part affected as a poultice, and to be renewed when it ceases to be moist ; for gout he holds by sarsaparilla ; for itch he prescribes a wash of lime-water in which mercury tied up in a linen bag has been suspended ; for apoplexy he commends dry cupping at the base of the neck and at each of the shoulders ; as a local application for gout he recommends one part of sal ammoniac dissolved in three parts of spirits of wine—really a very good lotion ; for ague he has faith in rue ; for hysteria he gives the palm to hartshorn. But here I must stop, for over a hundred and fifty formulæ, more or less passable, more or less loathsome, more or less useful, are before me.

Various Notes.

The chapter about *Vitiated Sight* is of moment, as showing its author's knowledge of colour blindness, of distension of the eyeballs, and of congenital cataract. In the essay entitled *Medicina Hydrostatica* he discourses at length on the hydrostatical examinations of medicines. In *Salubrity and Insalubrity of the Air* he dwells on the action of cosmical gases let loose into the atmospheric sea. In a treatise on the *Corpuscular Philosophy*, he discusses the reasonableness of specific medicines to that philosophy ; and in an elaborate chapter on the *Porosity of Animal Bodies*, he explains how various substances may enter the body by the skin, so that mercury may actually be precipitated in its elementary state within the cavities of bones.

Eighty-six pages of large quarto size in double columns of small type are demanded for the index of the works of Robert Boyle. In the whole range of scientific literature there is no one half so prolific as this writer. The index itself is a study for many weeks. I, like a gardener, have merely roamed through the domain of his written mind, and culled here and there a flower, plucked from a bed or forest of luxuriance and beauty. Even in subjects purely medical my difficulty has been in selection. Five years devoted to the contemplation of these works would give but an inadequate appreciation of their greatness, their usefulness, their simplicity, and their truthfulness. I would I had leisure to learn from them more and more.

TO THE END OF LIFE.

Before touching on the works of Robert Boyle I briefly sketched his life up to the middle period of it. Let me now, as briefly, resume the narrative and follow him to the close of his brilliant but comparatively short career.

In the time of the great wars, and during the short peace of the Commonwealth, he resided chiefly at Oxford and Stalbridge, retaining the friendships of Willis, Nathaniel Highmore, Wallis, Ward, probably Harvey, Wren, and the best minds of his age. For a time he visited Ireland to look after his estates there, returning to Oxford as early as he could. He was throughout a consistent Royalist, but he seems to have avoided all part in politics. On the Restoration he was received with much favour by the King (Charles II.) and his most powerful ministers, and settling down in London an unmarried man, he took residence in the house of Lady Ranelagh, his sister, in Pall Mall, then a fashionable quarter. He aided greatly in the foundation of the Royal Society, and was elected to the council of that body, to which he was a voluminous and invaluable contributor of papers and experimental demonstrations. He had, of course, his enemies, and amongst these Dean Swift, who nevertheless was probably indebted to him for the bright suggestion of *Gulliver's Travels*; but he bore all criticism with patience and unfaltering dignity. One Valentine Greatracks, a charlatan, who pretended to possess the power of curing diseases by stroking—a kind of mesmerism, as we should designate it—was forced on his attention by Henry Stubbe; but he was not to be imposed upon, and in an admirable reply he let Stubbe understand that, gentle as he was by nature, he knew true from false philosophy. Through the storms of the Royal Society he likewise sailed without censure; and, as we have seen, he wrote freely about physic without incurring the wrath of the keen-eyed and ever-jealous College of Physicians.

About 1689 his health began to suffer; and foreseeing that he had much to do and finish with but little time at his disposal, he issued a kind of card or notice in which he excused himself to callers, and put over his door an announcement to that effect. He also made his will, and settled all his private affairs, working on under a form of paralysis that was day by day more and more distressful. To his anxieties for himself, such as they were, the illness of his beloved sister, Sophronia, as he styled her, with whom he had lived in such homely communion, added its penalty; and she dying on December

23rd, 1691, he followed her on the 30th of the same month, aged sixty-four years. Boyle was buried in the famous church of St. Martin's-in-the-Fields on January 7th, 1692; and in the sermon preached on his death, Gilbert Burnet, Bishop of Salisbury, declared of him, "His design was only to find out nature, to see into what principles things might be resolved, and to prepare good medicaments for the bodies of men."

So be it the design of all men who would follow philosophy as their guiding star.

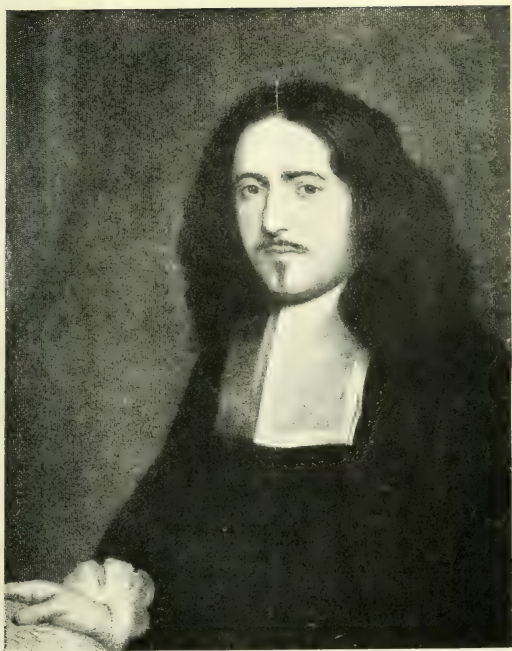
Marcellus Malpighi, M.D., F.R.S.

THE name of Marcellus Malpighi, renowned since the middle part of the seventeenth century, holds a distinguished place in all our medical treatises of the physiological order. His work in medicine, mainly physiological and anatomical, has always passed as true coin of science. Engaged in studies which were in their infancy in his time, his means for research were limited, yet whatever he did bears upon it quite a singular evidence of correctness, extending often to minuteness of detail.

His life in this way becomes, though it be short and uneventful personally, a mark for true scholars and a piece of fine scientific history when it is faithfully presented.

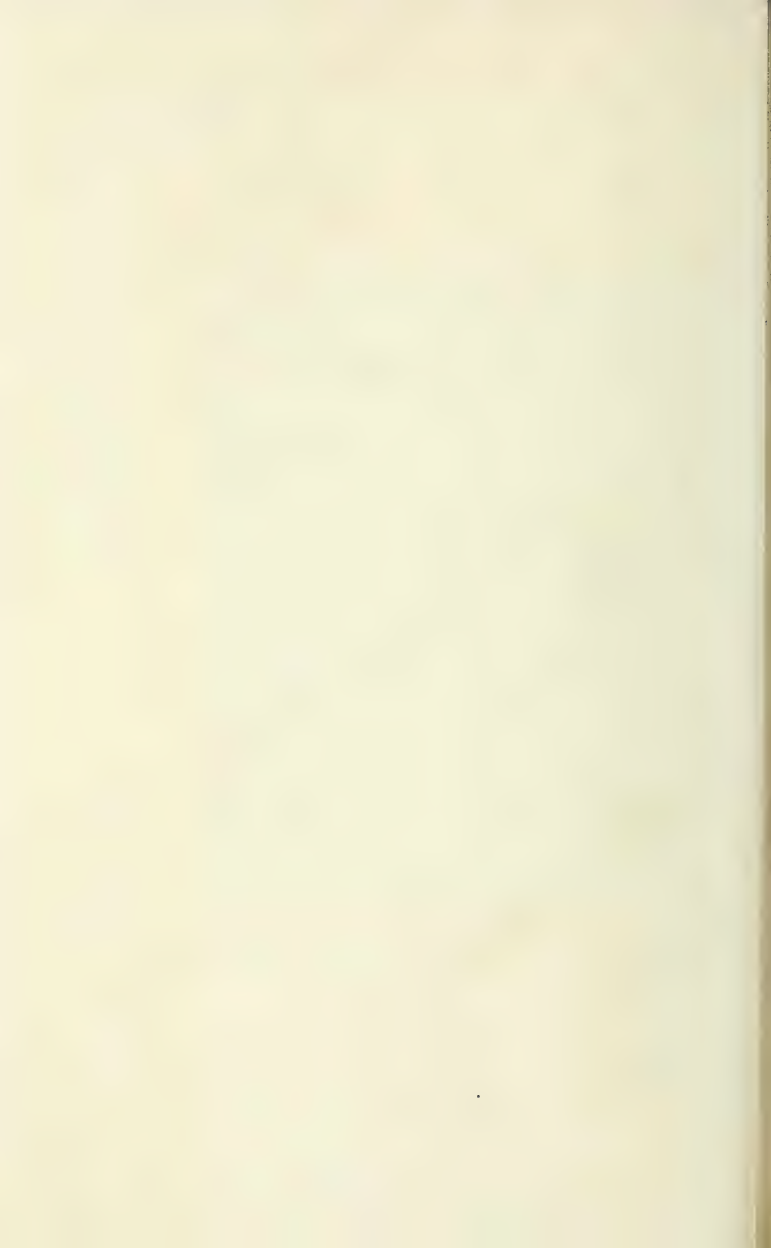
Malpighi was born just one hundred years before the famous surgeon, John Hunter. His birthplace was Crevalcuore, near Bologna, and the day of his birth was March 10th, 1628. His boyhood seems to have passed without any peculiar predilection for any profession, and he reached man's estate, following general studies in Bologna, giving probably his choice to all that related to natural science. In the year he became of age he lost both his parents; and being left to himself, he made up his mind to let medicine become the pursuit of his life, with a leaning to that part of it that was philosophical in character and had a bearing on physiological and experimental rather than on practical and clinical researches. He entered as a student of medicine into the university of Bologna, in his time one of the most famous medical schools in the world, and his two first masters were Professor Bartholomew Mascari and Professor Andrew Mariano. To Mascari he seems to have been devotedly attached. He lived at first in his house, where there was a private school of anatomy, and commenced his anatomical investigations there. Later in life he married the sister of Mascari.

I infer that under Mariano he studied medicine proper, but this



Marcellus Malpighius

From an engraving by W. Holl, for T. J. Pettigrew, F.R.S., after a painting by Tabor.



professor would be a man of advanced age; he had held his chair nearly forty years, and some time before his death, in 1661, he retired into the country to end his days.

Malpighi took his doctor's degree on April 6th, 1653, that is, in the twenty-sixth year of his age. His graduation thesis was devoted to the works of Hippocrates, whose thoughts and labours he endeavoured to revive, a task not very popular at a time when the Hippocratic philosophy was at very low mark, and when the influence of an experimental sect, dealing largely with alchemical problems, had risen out of the labours of what has been called the Arabian school, in which the Semitic element of learning played a most important and distinctive part.

The fervour in favour of Hippocrates and of the strictly practical method he founded was apparently of temporary duration, for Malpighi seems soon to have become distinguished in new studies relating to anatomical, physical, and experimental subjects.

He attained very rapidly—namely, in 1656—as the gift of the Senate of Bologna, a chair in his own university, but soon afterwards accepted a much more valuable appointment at Pisa, on the invitation of the Grand Duke of Tuscany, namely, Professorship of Physic in that university.

Malpighi, as he has himself told us, was not constitutionally strong; and he found that the climate of Pisa was not suitable to him. He held therefore his new professorship for a very short period—three years—and going back to Bologna, took up his former duties there. After another short interval he was tempted to move to Messina to take the chair of Professor of Physic at the university there, in the place of Doctor Peter Castelli. This post, again, was displeasing to him; and in spite of all solicitations and monetary considerations—for the chair was a very valuable appointment—he once more, after four years' absence, resumed his work in his native city, and remained in it until 1691, when he was summoned to Rome by Pope Innocent XII.—who, as Cardinal Pignatelli, had known him at Bologna—to become physician in chief to His Holiness, chamberlain in the Papal Court, and some, but not very reliable, biographers say, a prelate, as though he had taken orders in the Church.

THE LABOURS OF MALPIGHI.

The true scientific career of Marcellus Malpighi commenced at Pisa, where he had the good fortune to become the friend and

colleague of the great physicist Borelli, and no man could have been more fortunate than Malpighi in having such a colleague.

Borelli was at that time in middle life; he was full of energy, enthusiasm, and invention, and he was at the head of the iatro-mathematical school, which had then sprung into vigorous existence. From its origin this school distinguishes one of the most remarkable epochs in medical science; it has sometimes been supposed to have originated from the labours of Newton, but it commenced long before the Newtonian era, and was rather a product of the Italian schools than of any other. Borelli was favoured by social position, being a friend of the great house of Medici, and though by mixing in political strifes he had to move about and find shelter at last in the City of Rome, he never lost his scientific leanings or his love for those who followed his own lines of scientific thought and action.

Malpighi, evidently greatly influenced by this master, became a leader in physical sciences bearing on medicine, but not precisely after the same method. Malpighi's work rested on direct observation and what I may call the direct configuration of natural structures rather than on speculations relating to function. Even mathematical rules would not draw him far into speculative controversies. He came; he saw; he conquered: that is to say, he threw himself into Nature, he looked her in the face, and he conquered her by marking down what she said, observing her phenomena and simply reasoning upon them, leaving others to interpret. Hence he became a discoverer of parts of the bodies of animals, as other men become geographical discoverers by traversing new regions of the earth and describing them.

Again, for his day, Malpighi became a discoverer after a manner novel and, I doubt not, curious to first followers. He did not, like the previous anatomists, such as Aristotle, Vesalius, and Harvey, content himself with considering organs and parts in their mass. The older masters, doubtless, proved useful to him, as having done work which all could learn from, leaving much for their followers to glean. But Malpighi opened a new field: he anatomised parts of viscera, looking into them as his predecessors had looked into the body at large, and finding new worlds, as it were, in the little regions which he investigated. Towards this research he was led by the microscope, an instrument then in its infancy, but with which he really performed wonders in the way of new and original observation. It is rather uncertain what microscopical instrument or instruments Malpighi used in his inquiries. He was four years older than

Antony van Leeuwenhoek. They two were therefore cotemporaries almost of the same age; but Malpighi died, as we shall see, when he was sixty-seven years of age, whilst Leeuwenhoek lived until he was ninety-one, and in the latter half of his life did more microscopical work than in the first half. It is assumed by some, and I think fairly, that Malpighi made the first start in many of the discoveries, in respect to animal tissues, attributed to Leeuwenhoek, a fact that has a most natural aspect when we remember that he was from the first an anatomist and scholar, whilst Leeuwenhoek, a beadle in the Delft courthouse, was obliged to learn rudimentary anatomy as he made progress with his discoveries not only of structures observed through lenses but of lenses adapted and improved by himself.

As far as we know historically, Malpighi worked with a single microscopical lens not better than the half-crown lenses we meet with on the toy stalls of our day, and possibly wanting in the stage and darkened pupil which these instrument possess. Certainly he had nothing so good as the microscopes which his less learned cotemporary ultimately produced and left to our Royal Society, to be unfortunately lost there.

The scientific labours of Malpighi and Leeuwenhoek, it may be mentioned, were almost equally acknowledged and assisted by our Royal Society, and their works appear most prominently in the *Transactions* of that society. The first notice we have of Malpighi in the Society's records relates to his *Dissertatio Epistolica de Bombyce*, being a treatise on the natural history of silkworms. This treatise he dedicated to the Society in 1669, with the request that it might be published under its auspices. The request was complied with, and the work was put at once into the hands of the printer of the Society, and was published straightway with a licence signed by the President. This was during the time that Malpighi held the professorship of medicine at Messina. He had been elected F.R.S. the previous year—1668—and remained, the chronicles record, a constant correspondent until the end of his life.

To ascertain how true this statement is, I have taken the trouble to trace out the number of letters and treatises submitted by Malpighi to the Royal Society according to their dates. They run as follows: (1) A discourse on new discoveries in the egg (1671). (2) Three letters relating to the anatomy of plants and to his (Malpighi's) having seen "statutes" and pictures shining in the dark with flaming blue and white colours (1673). (3) A manuscript discourse on the anatomy of plants—with some elegant figures sent by sea from

Venice (1674)—in which he suggested that the sun, by the force of its heat, drives up the moisture from the ground into the roots of vegetables, and so causes the rising of sap, and that something like valves appear in the sap vessels of plants. (4) Observations and delineations of the structure of the galls of trees (1675). (5) A specimen demonstrating the circulation of the juices of plants (1678). (6) Notice, by Sir John Hoskyns, that Malpighi had observed that the reason of the mobility of the parts of insects after they are cut asunder is from the brain and medulla spinalis (1679). (7) A note that Laurence Bellini's medical works were printed at Bologna, in which was explained a course of physic by mechanical principles on a mathematical method, that Borelli's posthumous works were published, and that Father Bartoli, a Jesuit, had published a book on freezing and ice (1682). (8) A letter and discourse (a) *De Cornuum Generatione*.—(b) *Uteri Fabricâ* (1684).

The complete works of Malpighi, the *Opera Omnia*, very copiously illustrated, were published by the Royal Society in 1686 in two volumes. The first volume contains the first part of the *Anatomy of Plants* and various letters to Oldenburg and Spon; the second volume contains the second part of the *Anatomy of Plants*; dissertations and letters treating on the silkworm; the formation of the chick in the egg; exertations and letters concerning the brain, the tongue, the external organ of the skin, the omentum, adipose tissue and ducts; the anatomical structure of the viscera; and polypi of the heart and lungs. There is, in addition, a life of the author by himself.

THE ANATOMY OF PLANTS.

The work of Malpighi which seems primarily to have attracted the attention of the learned is on the anatomy of plants: *Anatomes Plantarum Idea*. It is richly illustrated, and forms a handsome folio volume, bearing date, in my edition, 1671. It was dedicated to our own Royal Society, and in producing it the microscope played a most important part. It was very natural that in the first examinations of structures by the microscope, plants should form the special subject of investigation. The tissues of plants were at hand, and admitted of being mounted and examined with facility. Sections were cut with great delicacy, and their semi-transparency rendered comparatively easy the discovery of their structure. Beautiful sections are depicted, very similar to those which our young microscopists study from at the present day. It has been correctly said by more than

one writer that Malpighi was amongst the first, if not actually the first, who detected sexual differences in plants, and showed in this way that plants were separated from minerals by a very wide distinction, and that they approached animals as things of life resolvable into classified families. He also discovered the vessels of plants, but, singularly, he does not seem to have detected that the sap or circulating fluid of the plant travelled through those vessels; yet he must have thought that some nutrient fluid traversed them, as he seems to have conceived the idea of valves as part of their structure.

It was natural that, in studying the natural formation of plants and of woody tissue, Malpighi should move from those structures to the structures of bone and teeth. He had observed that in plants the growth seemed in those which he had examined to proceed by the formation of rings or circular layers in the lateral direction. He conceived from this that bone was formed in a similar manner—*pari incremento procedit natura in ossium augmento*—and although he was not altogether correct in his comparisons, there can be no dispute that he was one of the first, if not the first, to see the circular layers of bone and to indicate that bone has an organic tissue for its base. His weakness consisted in assuming a general from a particular growth, and this the more when he came to describe the structure of a tooth. In brief, he got but a glimpse of tissues, such a glimpse as led him, to a certain extent, into error, and yet, at the same time, caused him to open the way to our better understanding of the whole subject of animal construction.

THE RETE MUCOSUM.

The anatomical structure of the body with which the name of Malpighi is most closely connected is the *rete mucosum*, or, as it is sometimes called, the *rete Malpighii*, in the layers of the skin. This structure, which, as we know, lies immediately under the epidermis, and which some anatomists consider to be the inferior layer of the epidermic tissue, was discovered originally and demonstrated by Malpighi. He considered this *rete* to be an independent structure, composed of fibres crossing each other, constituting a soft but distinct layer between the derma and the epidermis, and forming the bed of membrane in which the pigmentary matter of the skin finds its place. Much discussion has occurred since his day as to the accuracy of the original description. So great an authority as Bichat has actually doubted whether Malpighi saw a proper

membrane, and has suggested that what was considered to be such a membrane was nothing more than a fine plexus or network of minute blood-vessels which passed through the *cutis vera* and deployed over its surface. I think it is right to say that for a long interval the view started by Bichat in correction of Malpighi held its own. It was the view commonly received in my early days, but it has since been entirely set aside, to the advantage of the original observer, so that our modern students are taught definitely in the best of text-books that "the *rete Malpighii* is composed of several layers of epithelial cells, of which the deepest layer is elongated in figure and placed perpendicularly on the surface of the corium, while the succeeding laminae consist of cells of a more rounded or polyhedral form, the contents of which, soft, opaque, granular, and soluble in acetic acid, are often marked on their surfaces with ridges and furrows, and are covered with numerous fibrils, which connect the surfaces of the cells."

Malpighi knew nothing about cells as we do, but his general idea of construction was quite astounding for the day in which he lived. All that Bichat has written in criticism of him has turned out incorrect, and it may safely be said that the foundations of truth were laid by his skill, and that as foundations they remain unassailable. It seems to me, indeed, that Bichat, illustrious as he was, one of the few immortals in medicine, one historically amongst the first rank of all our craft, in this criticism merely followed the lead of Ruysch in his description of vascular structures.

Malpighi was of opinion that from the *rete* the colour of the skin is derived; in the *rete* he supposed was retained the colouring principle (which we moderns would call pigment), and which distinguishes, by colour, the races of men. Blumenbach entirely corroborates him on this point. "The skin of most animals, and of men consists of three parts: the external epidermis, or cuticle; the *reticula mucosa*, called from its discoverer the Malpighian; and lastly the inner or corium. The middle coat, which very much resembles the external, so that it is considered by some as another part of it, is evidently more spongy, thick, and black in Ethiopians; and in them, as in the rest of men, is the primary seat of the diversity of colour." For, he argues, "in all the *corium* is white, excepting where, here and there, it is slightly coloured by the adhering reticulum; but the epidermis seems to shade off into the same colour as the reticulum, yet being transparent as a plate of horn, it appears, even in black men, to be scarcely grey in colour, when it is actually

separated." But in another part of his works, in treating of the skin, Blumenbach rather modifies his views. He tells us that the corium is lined with a very tender mucus, affording a sort of glutinous bond, by which the epidermis, stretching over and protecting the surface of the body, adheres to the corium. This reticulum, he continues, just like the epidermis, is a most simple structure, entirely destitute of nerves and vessels, and differing from the nature of the corium.

Taking all the facts into consideration, as well as the arguments, we may safely give to Malpighi all the credit of discovery of the cutaneous membrane which bears his name, and we may give to him a further credit of detecting that the external colour of the different races of men is not due to any difference of colour in the blood circulating through them.

RESEARCHES ON GLANDULAR STRUCTURES, ESPECIALLY THE KIDNEYS.

From the date of the publication of his original work Malpighi has been accredited with being the first anatomist who described the structure of the conglobate glands. As far back as 1784 it was claimed for him that, with regard to the liver, he discovered its texture by his microscope; that he observed the organ to be made up in its substance of innumerable lobules, which are very often of a cubical figure, and consist of several little glands, like the stones of raisins, so that they look like bunches of grapes, and are each of them clothed with a distinct membrane. Also that the small branches of the cava porta, and of the biliary ducts, run through all, even the least, of these lobules, in an equal number; and, that the branches of the porta act like arteries, which convey the blood to, and the branches of the cava are as veins which carry the blood from, the little grapestone-like glands. From whence it is plain that the liver is a glandulous body, with its proper excretory vessels, which carry away the bile, the constituents of which were in the blood.

In the main this exposition is correct, as is also, to some extent, another exposition from him respecting the texture of the spleen, which organ he describes as made of innumerable little cells like honeycombs, in which there are vast numbers of small glandules, resembling bunches of grapes, which hang upon the fibres, and, fed by twigs of arteries and nerves, send forth blood, there purged into the ramus splenicus, which carries it into the liver—rather a crude physiology of the spleen, but, compared with what had gone before,

a remarkable advance. To this day we still speculate as to the nature of the Malpighian corpuscle of the spleen, whether it has or has not a capsule, and what is its precise function.

The great achievement of Malpighi, however, relates to his researches into the structure of the kidney. He seems to have come to the conclusion that in all glands there is one basic structure, namely, a cavity or follicle, in which secretion take place. If anything can be called a material discovery leading to a philosophical induction, this was one of the most striking and valuable, although Ruysch, led away by his fascinating skill in the process of injection of blood-vessels, controverted the idea of an intermediate body destined to cause secretion, and argued that as the injecting artery terminated direct in the duct, therefore secretion must take place in the artery itself. Ruysch had, I believe, few followers, and happily never succeeded in overthrowing the master who preceded him.

I may say, I think, without diverging in the least from historical accuracy, that up to the time of Malpighi no reasonable account had been given of the minute anatomy of the kidney. In order to arrive at the state of learning on this point in his day we have to turn to the text-book of anatomy then best known—I mean the *Mikrokosmographia*, a description of the body of man, by Dr. Helkiah Crooke, published on the last day of May in 1615. Crooke was enormously indebted to Vesalius for his illustrations; but he was a learned man, and many of his chapters are rich in historical quotation from the ablest of his predecessors. In short, his book is physiological as well as anatomical, and must have been a kind of encyclopædia of the Faculty of the period. His description, therefore, of the kidney must be studied as preliminary to Malpighian philosophy.

Crooke described that the kidneys are two vital organs covered with a double membrane; one outward, arising from the peritoneum as if it were wrapped in it; the other very thin, and surrounding the organ, making the outside glib and shining. The substance of the kidney is a hard flesh, most like the heart, except that it wants fibres. It has two venters, or cavities, one outside, which Fallopius called the gate, and one inside. It has also its artery, vein, and nerve, and a vessel emerging, called the ureter. In a series of tables or plates, taken chiefly from Vesalius, the kidney, both of the man and the dog, is shown laid open, and although the cortical and medullary structures belonging to a kidney are not described in the text, they are faintly shadowed in the drawings, and a series of "caruncles or

teats" are shown, each one like a calyx half surrounding a vascular body. There is, in short, a rough outline of the true thing, and it seems quite to be understood that the secretion of urine is derived from the arterial blood to pass away by the ureter.

Thus much of the kidney according to Crooke. Malpighi takes up the parable with some sort of microscopic lens in his hand, and begins to learn the true structure. He sees a surrounding or cortical substance immediately beneath the capsule, a substance of red colour, of granular consistency, and very vascular. He observes that this, like a roof, or arch, extends over a series of bodies lying within itself, and which he calls the pyramids, the base of each pyramid being connected with the outside or cortical matter above, and the terminal point, or nipple, of each dipping into the internal cavity, which we now style the pelvis.

Malpighi also observed that the pyramids were composed of a series of minute tubes, not, however, called tubes until probably a later date, when Laurence Bellini gave them the name of uriniferous tubes. But he did more than this: he discovered the little red bodies, scattered so freely through the cortical structure, now called the Malpighian tufts. He knew that these were vascular in their nature, and he conceived that from them the urine was secreted or derived, and was given over by them into the tubular structure of the pyramids, to be discharged by the ureters, and so to the kidneys. That he stopped here is no wonder, seeing how many of his successors went no further, and that it remained for one of our own generation—one whom I had the felicity of knowing, the late Sir William Bowman—to work out the problem of the capsule, the Malpighian corpuscle, the convoluted tubule, and the rest of the anatomical physiological problem, which every student in these days is bound to learn.

RESEARCHES ON THE CIRCULATION, AND ON BLOOD.

That a cotemporary of William Harvey should have turned his attention to studies relating to the circulation of the blood, and to the blood itself, is nothing more than would be expected. Harvey, great as was his work, left one point obscure; nay, not obscure alone, but in absolute darkness. He demonstrated clearly enough that the arteries poured their blood into the veins, but in what way they performed that feat he left altogether an enigma. He did not indeed undertake to speculate on this matter, and one might almost

suspect that in the blaze of his astounding discovery, he considered such a detail as unworthy of his regard. Or perhaps he may have felt himself too old and too weary to take up the study of this topic. Or perhaps again, and this may be still nearer the mark, he was personally unacquainted with the mode of investigation by that new eye of his day, the simple microscope. We know that with regard to Aselli and his discovery of the lacteal system, Harvey was touchy and apparently critical, showing something of the same petulancy as he had observed in other men relative to his own discovery. Yet the detail was really necessary, for if, under the new eye, there had been found no passage between artery and vein in the structures of the body, the theory of the circulation of the blood might have been imperilled.

Malpighi himself made the discovery that was essential to complete the Harveian triumph.

In the article on Leeuwenhoek, the question of the discovery, visibly, of the circulation from artery to vein is discussed at considerable length. It is there stated that Leeuwenhoek was not the actual discoverer of the capillary circulation, but that he gave the final and unmistakable proof of it through the sense of sight. He himself, indeed, made no claim, although the discovery is so generally attributed to him. The true discoverer was Malpighi.

The history of this original observation is rendered in Malpighi's second epistle, *De Pulmonibus*, an epistle addressed to Borelli, with whom, as I have already shown, he was in intimate communion. It bears date 1661, and as Leeuwenhoek's description was in 1696, Malpighi is thirty-five years earlier. The lung structure would present a tempting field for new microscopical observation, and Malpighi turned to it with great success. By means of his lens he discovered the passage of the blood through the membraneous part of the lungs, after which he directed his attention to the mesentery, in which structure he noted the same phenomenon.

Another discovery of a microscopical kind connected with the lung structure was that of the bronchial surface and the course of the air tubes. It is but fair to give to Malpighi the credit of having traced the course of the bronchial passages to their minute, if not to their minutest, disposition. He had not the means at command to display to him the vesicular termination of the air passages, but he traced the tubes very far towards their termination, and he pointed out most correctly the manner in which the air reaches the blood, so as to communicate to the blood its vital parts. By this exposition

he threw a direct light upon the phenomenon of respiration, and defined what was the meaning of that process ; thus paving the way for the after-researches of Mayow, who originally suspected the absorption of the nitro-aërial spirit, since designated oxygen.

From the mechanism of the circulation, Malpighi passed to the blood itself, and again showed unusual correctness. Being in practice as a physician when blood-letting was a common remedy, he could not fail to note the appearance of that buffy coat which forms on blood in inflammatory cases of disease. He entered slightly into a description of this phenomenon, but his skill consisted chiefly in distinguishing that blood is made up of three parts ; of the white matter which we call fibrine, of the red-coloured corpuscles, and of the watery or serous portion. He apparently knew that in healthy blood the crassamentum, or coagulated substance, is made up of fibrine, holding and mixed with it the red bodies, corpuscles ; and it is obvious he saw these corpuscles with his microscopical lens, although we may be pretty sure that he did not understand their structure, nor so fully appreciate their physiological value as we do in this day.

To the profession generally the labours of Malpighi above recited are those likely to be of greatest interest, but they by no means cover the ground which he traversed. His articles on the formation of the chick in the egg ; on, what may be called, the natural history of the silkworm ; his anatomical disquisitions—*De Lingua de Cerebro*, *De Externo Tactus Organo* ; *De Omento Pinguine*, and *Adiposis Ductibus* ; and *De Viscerum Structura*—have become classical, and are blended in his hands with the works of Willis, Glisson, Fracassati, and Bellini, to all of whom he gives the warmest acknowledgments. His treatises on the liver and on the cortical structure of the brain, as well as those on the kidney and spleen, are truly classical, and, although out of date, deserve to be referred to as guides to the history of discovery on the subjects to which they relate. His essay on the liver, whether we regard the description of liver structure, the production of bile, the bile duct, or the nature and the uses of the bile, are more than curious, containing many original thoughts which must to many of his colleagues, have seemed strange, if not incomprehensible.

MALPIGHI AS A PRACTITIONER.

By a kind of common consent the cotemporaries of Malpighi have considered that in practice he was not of much consequence. Their

ideas on this matter must be accepted, however, with many considerable grains of salt. The same argument was used against William Harvey, but not without some qualification, for Harvey, it is certain, instructed the surgeons in their operations, used the speculum for observations on the uterus, wrote a volume, unfortunately lost, and acted as physician to a large hospital. Malpighi practised, we may presume, much in the same manner, and we have no reason to doubt his being a very good practitioner. All that can be said against that view, indeed, is based on evidence purely negative ; that is to say, he did not leave behind him much that is called practical. The reasons why he did not are obvious.

In the first place, he would have little time for observing, recording, and publishing so-called practical details. He was by nature an experimental observer, an observer bent on original investigation, living apart from the current thought and practice that surrounded him. He was learning a new Science, and, while he honoured the past, was more wistful of the future than of the present. He would probably mix little with those who lived in his sphere, except with such men as Borelli and the very few of that stamp. The fact that he sent his best works to the Royal Society of England for discussion and publication is all-sufficient as showing that he had little scope for original display in his native country. The many of his contemporaries, therefore, would have very few opportunities of knowing much of his ability as a practitioner, and, as he would be talking a sort of scientific mystery on topics peculiarly his own, they would be sure to extend his mysteriousness to those topics with which they considered themselves most familiar. He would be a clever man, a learned man, a peculiar man, a genius, in their estimation, and that would finish him as a practitioner. How could he know what they knew, when their ideas of bodily organs and functions were in one direction and his in another ?

In the second place, his own mind would be very much out of tune with the current ideas of practice, a fact which is elucidated by a remark of his against too profuse blood-letting in cases of acute disease. He would see, as the range of his own vision enlarged, what a number of absurdities existed in practice, and held their place as if they were the most distinctive gospel. Not combative in his nature, and too occupied to be very persuasive and patient in his teaching, he would not be a man who would in his own time and place make many converts, to his own peculiar explorations, nor would he, indeed, see the full value, or application, of his own

discoveries. He would wonder and go on, not waiting for results of a startling kind, but feeling sure that good results would one day be the fruits of his exertions. This is the right tone for an original observer to acquire, and it is doubtful whether a truly original observer could work under other influences, because if he stopped at the *Cui bono?* he would most frequently have to stop altogether. Malpighi certainly did not rest at the *Cui bono?* and therefore would not be rated as a practitioner. What mattered it about the structure of the kidney to the practical man? They wanted a medicine which would act on the kidneys, a diuretic; or, a medicine which should not act on the kidneys, or a medicine that should stop over-action. That was practice. Malpighi's name, going down with a piece of microscopical anatomy called the Malpighi tuft, was history—very creditable to Malpighi, very honourable to Italy and Bologna, but it was not practical; therefore, practice, to Malpighi, would not be an exercise possessing many attractions. He would do his duty, leave the rest to nature—and throw all pills, salves, and nostrums generally, aside as too often the scybala of medical digestion.

For these reasons, singly and combined, Malpighi would not rank amongst his medical cotemporaries as a remarkable practitioner. Probably, indeed almost certainly, he would not be what is denominated a popular practitioner. Yet, that he had his admirers is proved by the circumstance that the new Pope, who had known him at Bologna, no sooner assumed the *tiara* than he sent for him to his court, installed him there as his physician, and loaded him with honours. I do not wish to convey from this that such recognition carried with it any proof of scientific distinction in his profession; for courts are, it may be said, poor judges of true merit, and are as likely to ruin as to make the reputation in history of a truly great man. I merely wish to indicate that some men of learning and position must have trusted him even from the bare practical point of view, and honoured him for his worth as a physician as well as for his skill as an original investigator and for his wisdom as a philosopher.

Lastly, on the practical side he was not lifeless. With true insight he detected that the fibrous part of the blood and the plastic exudations of pleurisies were of the same nature, and that the white fibrous masses, called by his predecessors polypi, and which—as I have shown in my work on fibrinous deposition—were actually believed to be polypoid animals—came from the blood directly, were separations or deposits from the blood, and were the mechanical causes of death in many lingering diseases.

FINALE.

I must rest at the end of his labours, when he rested from them, not full of days, for he was only sixty-seven years of age, but full of fame and honour. The choicest recognitions had been paid to him. The Academy of Arcadians in Rome had received him into their body. The Royal Society of London had not only enrolled him as one of themselves, but, by the publication of some of his choicest works, had given to him a most distinguished place in their archives. His own University of Bologna had raised a monument to his memory; and, during his short residence in the Eternal City, a medal was cast, on which his own features were rendered on one side, and a design bearing upon his botanical and microscopical studies on the other. He was admired, and he was beloved, as one of gentle life and persistent industry. Physically, his brain was in him the most active organ, and suffered first. Whilst in the Quirinal Palace, he fell under a stroke—what a telling word it is—of apoplexy. There was rupture of cerebral vessel with effusion of blood into the ventricles, effusion that continued to increase, for he did not at once succumb, but, paralysed on one side of his body, remained helpless four months and five days. Then, under increasing pressure from an unusually large mass of blood in the ventricles of the brain, he breathed his last.

Malpighi, according to the custom followed in his day on all great people, was embalmed, and his dead body, taken with great ceremony to Bologna, his native city, was entombed, with much pomp, in the church of St. Gregory, his final resting-place. A statue there was also erected to his memory; but his best title to lasting honours is in our own Royal Society in the boarded volume.

MARCELLI MALPIGHII.

PHILOSOPHI ET MEDICI BONONIENSIS.

E

REGIA SOCIETATE.

OPERA OMNIA.

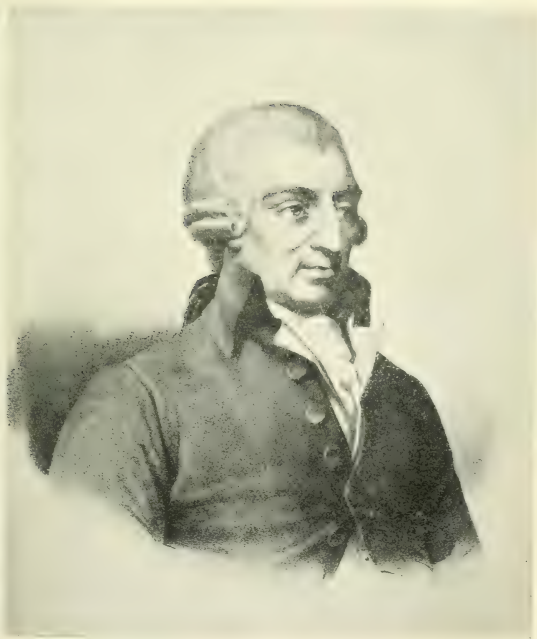
John Howard, LL.D., F.R.S.

I HAVE been led to write this life of John Howard from the circumstance that I had the honour to take part, on March 28th last (1894), in the ceremony of unveiling the statue, by Alfred Gilbert, R.A., of the great philanthropist, in the town of Bedford. It was arranged that the Duke of Bedford should perform the act of unveiling this splendid work of art, and that the Mayor of Bedford, G. Wells, Esq., should receive the same, on the part of the town, from the Chairman of the Executive Committee of the Howard Memorial, Mr. Frederick Howard. This was all done with great spirit; but there was another event expected—namely, that the Right Hon. Arthur Wellesley Peel, Speaker of the House of Commons, would deliver an inaugural address or oration befitting the occasion. Unfortunately, Mr. Peel was, at the last moment, prevented by illness from performing a task for which he was, on every account, so eminently qualified. In the dilemma the Mayor and authorities invited me to the ceremony to undertake the duty. It was an impromptu duty, discharged in the speech herewith supplied as an introduction to the biographical details of the life of a man who, though not technically a medical man, was so skilful in medical and sanitary studies, we may almost claim him as of our fraternity.

INAUGURAL ADDRESS.

“Right Worshipful Mayor, your Graces, my Lords, Ladies, and Gentlemen—It was a perfect idea that the first commoner of England should have spoken to you to-day about one of the most illustrious commoners England has ever produced; and I throw myself on your forbearance in an endeavour, feeble as a passing shadow, to perform at your request, and on briefest notice, the duty. It is not want of knowledge of John Howard that makes me hesitate,

for his work is familiar to me as a household word, through his best, his truest biographer, my late friend, Mr. Hepworth Dixon, whose widow and life-helptestmate attends our ceremony to-day. There is also this further bond, that to me as a sanitarian, teaching for forty years that national health is national wealth, and that bodily and mental health are one and the same, the labours and writings of this illustrious man, whose memory we now celebrate, have been foundations of scientific research—gospels, if I may reverently say so, of sanitary faith and practice. Enough! you may be tempted to exclaim, enough to prevent embarrassment. No, not enough. For the mightiness and the mighty results of the work of John Howard are too overpowering to be approached in a few words. I listen back to the most eloquent of voices of his own time, to words such as none but Edmund Burke could utter: ‘He has visited all Europe—not to survey the sumptuousness of palaces or the stateliness of temples; not to make accurate measurements of the remains of ancient grandeur; nor to form a scale of curiosity of modern art; nor to collect medals; nor to collate manuscripts—but to dive into the depths of dungeons; to plunge into the infections of hospitals; to survey the mansions of sorrow and pain; to take the gauge and dimensions of misery, depression, and contempt; to remember the forgotten, to attend to the neglected, to visit the forsaken, and to compare and collate the distress of all men in all countries. His plan is original, and it is as full of genius as it is of humanity.’—Yet even this tribute of eloquent respect and affection falls short of the full reality. The distinguished sculptor, Mr. Alfred Gilbert, who has produced the work which you, Mr. Mayor, are about to receive for the town over which you so right worthily preside, has felt the difficulty of the way in which he should present his subject to the present and the future. With the spirit of true genius, having no better guide, he has clothed your philanthropist with the attributes of strength, contemplation, action. All three are embodied in his figure: strength, thought, life, breathe in the form before us, and carry their wonderful suggestions. Perchance, the figure is recalling the love of that dead wife with whom frankly, before marriage, he struck the stern bargain that in all disputes his voice should rule, but who ever afterwards was the minister of her every wish, every desire of her heart attuned entirely to his own. Perchance he may be meditating on a day soon after his election (at great risk to his fortunes) to the post of High Sheriff of Bedford, when he was first tempted to look into the prison at Bedford, and seeing the monstrous



John Howard

From a portrait preserved in the Howard Chapel, Bedford, and facsimile autograph.



iniquities perpetrated there, resolved to visit prisons within reach of his industrious mind and body with the hope of exposing evils and removing them. Perchance his mind is dwelling on some scientific problem, on some choice work of art or some joyous landscape he has seen ; or, perhaps, like his predecessor, the immortal dreamer of the prison, he is musing on the world to come, the golden city, or the interminable lake of never-ending fire. Whatever may be the meditation, the artist has wisely determined to let contemplation play the chief part, knowing well that the resources of art, concentrated on one subject, however grand, are limited. Had the admirable skill of the artist been unlimited in regard to form and pose, what endless John Howards he could have modelled out for our delectation ! He might have depicted a firm, erect, proud prisoner in the French prison at Brest, where his flashing eye struck absolute terror into the hearts of his custodians, although his life was in their hands. He might have depicted him casting his grasping, courageous glance on the blood-red chamber of the Spanish Inquisition at Valladolid, on the painted cap, the robe, the stool of the victim ; on the throne of the chief inquisitor, on the horrid picture upon the walls of ninety-seven victims marching in procession to the flames ; or, demanding of the Fathers of the Holy and Apostolical place that he, John Howard, might, for the sake of truth, be permitted to spend a month as a prisoner in one of the pitiless, bedless, seatless, lightless, breathless, and almost foodless cells, in which at that very time, for three years at least, many living victims were rotting out their existences. He might have depicted the undaunted explorer in foul dens detecting how death in one den raged always in rapid fever flame ; in another killed by slow exhaustion, stealing drop by drop the vital powers. He might have depicted him firm, jubilant, thankful, at the bar of the House of Commons, receiving the thanks of the representatives of the nation. He might have presented him by the couch of a dying girl in Russian Tartary exposed to the deadly poison that laid him in the dust. He might have offered him as the triumphant martyr anticipating the grateful thanks of mankind for blotting out stains and pains inflicted in the name of justice, by man on man ; or as one listening with far dearer hope than any human tongue could express for the voice from the skies, "Well done !" The artist has, I repeat, wisely summoned all his genius to represent strength, contemplation, action—for these were Howard's trinity of heavenly virtues. Inspired John Bunyan, richer in imagination, sends forth a hero of the mind to face dangers, overcome difficulties,

and gain the diadem. Howard goes forth alone, himself the pilgrim, the martyr, and the victor. Strange in fate, that one town should be the home of two such representatives of tribulation, conflict, glory. Strangest of all is the miracle which Howard wrought. Before his time the prisons of our country were the foci of the foulest of foul diseases, of idleness, of crime. Now, though still prisons, they are the purest centres of physical health, homes of industry, and in time to come schools of a newer and better life, until they cease to be required.

"It is often the fact that the miracle-worker is forgotten in the commonplace of his success. But in the case of John Howard, in him we would fain let the miracle, the marvellous presentment of strength, contemplation, action, live on. A strength nourished on a simplicity itself a marvel; a strength extracted from the firstfruits of the earth, without one grain of artificial aid from foods that irritate and drinks that burn, corrode, weaken, kill. *A strength* of mental quality that knew no distinction between self and humanity, and treated even possession as a trust. Strength of real philanthropy laid in nature, as eternal as herself, and that carried its owner, unprotected, through thousands and thousands of miles, perils, trials. *A contemplation* that reckoned up human character from environment; that discovered how many men, accounted good men, fostered crime by the means they took to prevent it; and that inculcated progressive civilisation, by the study of principles before practices, prevention before cure. *An action*, mental and physical, perpetually tending towards the highest good in the swiftest time compatible with the noblest industry.

"Mr. Mayor, we call this event a ceremony; let us call it a consecration. In the wilderness of this world we have set up a sign. It is that of a figure touched with celestial fire, like the allegorical pillar leading to the land of promise. May it remain a beacon to ourselves, to our children, to their children, to all passers-by in the wilderness of this world, and to the honour of Bedford—for evermore."

EPITOME OF THE LIFE OF HOWARD.

It has been an endeavour of mine many times to trace out the birthplace of John Howard. A spirit of curiosity has prompted me to this endeavour, a spirit possibly caught from his very best biographer. During the short stay at Bedford on the memorial festival above referred to, I made fullest inquiry there whether anything new

had been discovered on the subject—to obtain nothing new, but to read a criticism that Bedford had no right to claim him as one of her distinguished children. In plain fact, we do not know the date of his birth within four years—1724-7; and out of four places—Hackney, Enfield, Clapton, and Cardington—we fail to make sure of any one of them as a birthplace. Dixon adds to the difficulty by the not unnatural suggestion that, as Howard's father, also John Howard, lived for some time in Smithfield, the illustrious son may have been born in Smithfield. No register, however, tells us, and by inference alone we gather that he came into the world in 1725. Howard himself says not a word relating to the event of his nativity. There was scarcely anything personal to himself and lying between his own existence and the world that concerned him. He left no memoir, he left nothing but his noble deeds for history. I do not think he was right in this matter, for truth made memorable by life ought ever to stand above inclination, even above inclination towards self-repression and modesty.

Whatever his origin, he was born holding an old Saxon name; one of a family belonging to a garden or enclosure. Dixon says that from the equator to the pole, where the name of Howard should be pronounced, twenty hearers of the sound—understanders, of course—would instantly think of the "Martyr of Humanity" and the family of the Hereditary Earl Marshal of England. To which observation he adds, "No—let Howard stand alone." I scarcely agree. There is much in John Howard and the "Martyr of Humanity" that is in common, nay, that is the same. And are not mental qualities "atavistic," if I may use such a word? Let it pass. John Howard was born as the son of a previous John Howard, a merchant, who in his time was a well-to-do man, about to retire from business, and luxuriating in three residences at least: one at Hackney, one at Enfield, and one at Cardington, by Bedford. His mother, bearing the maiden name of Cholmley, died when he was young, and he, the son John, if he were not born at Cardington, was nurtured as a motherless infant in that retired spot. He was a feeble child, took to his lessons slowly, spent seven years at the school of the Rev. John Worsley, and departed thence "not fully taught in any one thing," as he himself testified. His next removal was to the school of Mr. John Eames, in London, Eames being a man of note, a Fellow of the Royal Society, a friend and, in a certain sense, an assistant of the immortal Sir Isaac Newton. Under Eames he obtained a good serviceable education, not classical but

most practical; good French, good geography, good knowledge of men and things, fair knowledge of scientific facts, and clear common sense. To a man so armed, Latin and Greek may be and are accomplishments, but they are not essentials to highest success, and they sometimes, when they are much forced, generate a false pride which stands against success, making great men prigs and little men fools or conceited idiots who want to take the first places in the world, and, not daring to, dance attendance round the truly great or are the tools of superficial knaves, who pretend admiration and take advantage of imbecility.

Howard's education had none of these faults. Like all good men, he learned what Nature had constructed him to learn and no more. He did not blame his industrious mind because it did not know what it was not born to acquire; but, feeling sure that Nature intended a good variety of minds as she intends varieties of fruits and flowers, that the world may be sweetened and variegated, he accepted his own advantages with his own defects, and trudged on feeling none of the bitterness of jealousy, and working away with all his heart amongst all sorts and conditions of men, the friend of all in his own time and in the future; a grain of the true salt of the earth.

John Howard left Mr. Eames' Academy, date unknown, with little appearance of any distinguishing trait. Dr. Price, who became one of the first founders of our modern appraisers of the value of life from a commercial point of view, was a scholar with him, and became an intimate ally. Next to a good and, there can be little doubt, sound education, he was well fitted for entering upon the broad road of life, for following his father as a merchant of good degree. He was apprenticed to Messrs. Newnham and Shipley, grocers, of Watling Street, in the City, the premium paid down for him being seven hundred pounds sterling. The business was wholesale, leading those in it to a wide and extensive knowledge of, and close intercourse with, many men, many places, and many things. I infer, from occasional expressions he himself lets fall in the after-work of his life, that trade, though not strictly congenial to him, was not oppressive, and that during the term of his apprenticeship he devoted himself patiently and sedulously to his vocation. Happily and unhappily, he never finished his probation. When he was about seventeen years old, his father died—date of death, September 9th, 1742—leaving him quite independent, and

residuary legatee of the paternal property, with certain reserves for his sister, so soon as he should be twenty-one years of age. To guide him were three trustees, Lawrence Channing, Joe Whithead and Lewin Cholmley, who were so confident of his powers to manage his own affairs that they left him practically the monarch of all he possessed, immediately that the first disposals of the property—and it was a large property—were carried out.

Howard, now rich, was soon freed, by mutual arrangement, from the bonds of apprenticeship. He repaired the old house at Clapton and, having always a turn for travel, he started out on the grand tour through France and Italy. His tour lasted about two years, and on his return to England he located himself, not at Clapton, but at Stoke Newington, then a lovely village, noted for its salubrity.

And here there appears a bit of personal history about Howard which mounts to historic drollery, in matter of love and marriage. Howard, a young man disliking the landlady of the lodging he first took, transferred himself to another lodging, kept by a widow lady, Mrs. Sarah Lardeau, fifty-two years of age, and the relict of a clerk to a white lead manufacturer. The lady had no beauty, no soundness of health, no fortune, no learning, no high quality of mind, that should tempt a rich man of twenty-five, given to melancholy and to a kind of poetic inspiration; a man fond of riding out alone, and whilst his horse grazed by the wayside, of lying down by a tree or brook rapt in contemplation of diverse things; love, let us suppose, inclusive. Yet, strangely, this good and matronly lady, sweet of disposition certainly, devoted in her attention to the youth, still weak and despondent, bordering, some said, on consumption—she, a mother to him, won his young heart unwittingly, so that, like Cæsar, he came, saw, and conquered. His conquering was not smooth, however—"the course of true love never does run smooth," and the victory only came after his solemn declaration that if she said no to his offer he would be an exile for ever to his family and friends. What could a feeling woman do but give way? How could a widow of fifty-two bear the weight of such an exilement? She did not bear it; she kept the would-be exile at home by giving herself away and becoming Mrs. John Howard number one.

Mrs. Howard lived about three years—lived to know that she had obtained one of the kindest of husbands, who, tending her with the sweetest care up to her death, laid her finally to rest in St. Mary's, Whitechapel, and, himself broken-hearted, left Newington, passed

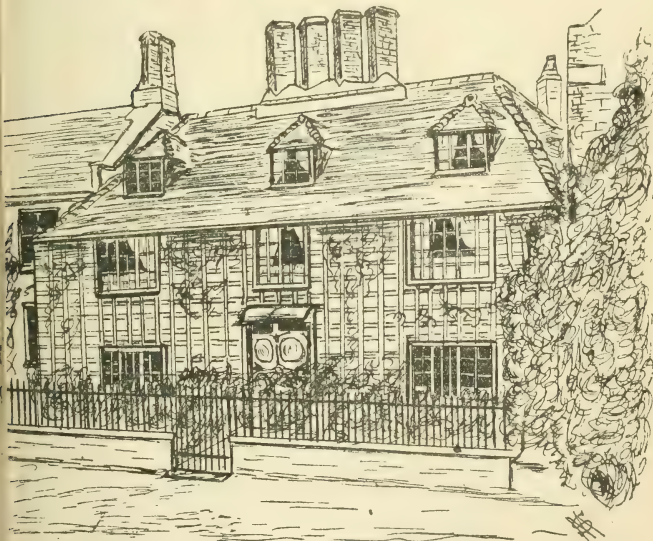
her little savings over to her sister, presented the bulk of his furniture to the poor of the village, and retired for a time to a lodging in St. Paul's Churchyard, not, under the circumstances, an inappropriate site.

I referred in my address to the manner in which Howard overawed the French soldiers at Brest. The fact is connected with a bit of his life which occurred soon after the death of his wife. He had started out for Portugal in the ship *Hanover*, for the purpose of seeing the remains of Lisbon after the great earthquake there in 1755. On his way, the *Hanover* was made prisoner by the French, and he was carried first to Brest, then to Morlaix, then to Carpaix; from which latter place he was, after a residence of two months, allowed to return to England, in fair health, but destitute of money and the common necessities of good food and decent attire.

From the moment of this eventful return to his native country, John Howard took rank to the title of "Howard the Philanthropist." He had witnessed, in his captivity, the horrors of captivity, and his first efforts were devoted to the care of those he had left behind bearing the captive's curse. His labours were successful in liberating many other prisoners, and, a little later on, as if weary of London life and society, he went back to the home of his childhood at Cardington, near Bedford, his fondest English home. This was in the year 1756, from which time up to 1758 he was once more a student, and, in the end, once more a lover. Henrietta Leeds, of Croxton in Cambridgeshire, daughter of Sergeant Leeds, a barrister of some position in legal circles, crossed his vision. To her he proposed, and her he married on April 25th, 1758. Dixon, describing her with "her portrait before him," says, "It has about it a look of home—a quiet suggestion of domestic love and peace." In a brief sentence, his affection for her, and hers for him, was sealed till death did them part, which it did on Sunday, March 31st, 1765, four days after the birth of their first and only child. The happiness of John Howard with his second wife appears to have been complete, notwithstanding a bargain struck by him before their marriage knot was tied, that in all matters on which there was difference of opinion between them "his voice should rule"—maybe one cause of the happiness.

The course of his life now at Cardington was serenely beautiful. He was a student again, making visits to the Metropolis and gaining friends—largely, it may be supposed, through Dr. Price—among scientific and learned celebrities of the day. On May 20th, 1756, he was elected a Fellow of the Royal Society, to which learned body in

1764-5 he sent a paper, published in the fifty-fourth volume of the *Philosophical Transactions*, at page 100, under the title, *An account of the Degree of Cold observed in Bedfordshire*. The paper shows the fact that his studies were warmly meteorological, and tradition tells us they were coldly so as well as warmly ; for I remember my late attached and most able friend, Dr. Herbert Barker, of Bedford, taking me some forty years ago to the Howard garden at Cardington,



JOHN HOWARD'S HOUSE AT CARDINGTON.

and, in company with the late Mr. Samuel Whithead, showing me the place where, at an observatory Howard had built there, he kept a Fahrenheit's thermometer which, winter and summer, he rose every morning at two o'clock to read off and register in his table of temperatures.

Mrs. Howard's health appearing to necessitate a change, Howard bought a cottage at Watcombe, in the New Forest, and there the two spent nearly four years happily and very much esteemed by their

neighbours ; but the place not suiting Mrs. Howard, they returned to Cardington, re-embellished their house, and fell back upon old pursuits, largely improving their estate with new and wholesome cottages for the poor, and by every means in their power bringing health, happiness, and content to all who, more or less, were dependent on them. They were advanced politicians. They held that property had no right to add to wealth by accumulation, and that the surplus of one who had enough must be distributed to those who had not enough—a modest socialistic theory, which, practised faithfully, might have been, at the proper and earlier time for its development, the remedy for many woes pending and yet to come in our present revolutionary epoch.

There occurs now a chapter in the life of John Howard which Dixon, to whose masterly pen I am deeply indebted, has dwelt upon with much tenderness. It dates from the second Mrs. Howard's untimely death, in 1765, up to 1770. The period extends over an interval of five years, and is one of continued restlessness, travel, and endeavour to bury the sad past in variety of place and action. It begins in Bath, where he conducted some researches—which were communicated to the Royal Society—on the Bath waters. It includes a journey to Holland, another one to Italy from France, with seven days spent in crossing the Alps ; a kind of holiday at Geneva, and some days at the "dirty city of Paris," where "the streets were so narrow, with no footpaths, that there is no stirring out but in a coach ; and as to the hackney coaches, they were abominable." Through many "desolate places of ancient grandeur" he thus whiled away his time. In July 1770 he got to Heidelberg, and in September of that year, passing to Rotterdam, he once more found his way home, "very desirous of returning with a right spirit, not only wiser but better ; with a cheerful humility—a more general love and benevolence to his fellow-creatures ; watchful of his thoughts, his words, his actions ; resigned to the will of God, that he may work with God, and lead a more useful and honourable life in this world."

He returned to Cardington, and in 1773 was put forward as High Sheriff of Bedford. He did not court the office ; it was one of those trusts that will, from time to time, come of a surety to powerful men, and by bold and honest men will be accepted, although opposed to their tastes and pleasures. In Howard's case it was, singularly and uniquely, a bold acceptance ; for he, an Independent in religion, could not, in accordance with the then existing infamous Test Act, receive the Anglican Sacrament before entering office, and

exposed himself, therefore, to the risk of the heavy fine of £500, with many of the most serious social disqualifications. He accepted the risk.

And now the greater life of John Howard commenced. Literally he went to prison, but never as prisoner had gone before, of his own free will and mere motion. It was his duty as Sheriff to hear the trials of prisoners at Bedford; it was also his duty to visit the tried and condemned in their prison. The prison at Bedford was a centre of shame and, I had almost said, infamy. It was not worse than many other such places, but it did well as a bad model. It was the prison in which John Bunyan, with many privileges, had lain twelve years, and had suggested so much that is now immortal, so we must not say too much against it; but it was a bad, very bad place. Howard's first description of it, from which all his others were born, tells the story of his enlightenment. He saw innocent men and women, whom the law, after trial, had declared innocent, or whom a grand jury had acquitted, sent back to prison till they could pay the gaolers' fees. He proposed a county rate to meet this crying evil; and his brother magistrates wanting a precedent, he travelled from county to county to find one. He found no such thing; but he did find, in the prisons of his own country first, and, in time, of other countries, such mountains of misery as to make one behold a human race without common knowledge of the first elements of civilisation. Thence onward he devoted all his life to the teaching of a better discipline—illuminated it with all the enthusiasm vulgarly called fanaticism, and closed it with all the heroism of the noblest martyrdom.

THE WORKS OF JOHN HOWARD.

Two papers for the Royal Society written by Howard have already been noticed. They are of minor moment. His lasting work is that on prisons and hospitals. In this we find him nearest to our highest, grandest branch of medicine. Here he plays the true part of the good physician. As we, in our practice, go from bed to bed looking at the diseased in their sick chambers, so he went from county to county, country to country, to see the disease of crime, in order to cause its prevention—to study its treatment, prevention and cure.

The description of Burke, already quoted, is a sufficient stamp of his labours and their rewards. Let it suffice for me to say that he traversed these islands far and wide investigating the state of the prisons; that he drew up a report of them; that he was examined as

witness respecting them before a committee of the whole House of Commons ; that he was called to the Bar of the House to receive from the Speaker the message that "the House is very sensible of the humanity and zeal which have led him to visit the several gaols of this kingdom, and to communicate to the House the interesting observations he has made on the subject"; that his labours were crowned with eminent success here ; and that later in his life, on the continent of Europe, his unflagging zeal in the same direction made him one of the wonders of the world of philanthropy and progress.

This told, let me add one or two of the observations of a sanitary kind, which are of some value to us even in this generation, and will probably remain of interest when many other generations have passed away. It will be gathered from these brief extracts in how many ways he anticipated certain of the great sanitary reforms which have not, until quite recent dates, been carried into execution.

The Cause of Gaol Fever.

"If it were asked," he says, "'What is the cause of the gaol-fever?' it would in general be readily replied, 'The want of fresh air and cleanliness.' But as I have found, in some prisons abroad, cells and dungeons as offensive and dirty as any I have observed in this country, where, however, this distemper was unknown, I am obliged to look out for some additional cause of its production. I am of opinion that the sudden change of diet and lodging so affects the spirits of new convicts, that the general causes of putrid fevers exert an immediate effect upon them. Hence it is common to see them sicken and die in a short time, with very little apparent illness. Convicts are generally stout, robust young men, who have been accustomed to free diet, tolerable lodgings, and vigorous exercise. These are ironed, thrust into close, offensive dungeons, and there chained down, some of them without straw or other bedding ; here they continue, in winter, sixteen or seventeen hours out of the twenty-four, in utter inactivity, and immersed in the noxious effluvia of their own bodies. On this account the gaol-distemper is always observed to reign more in our prisons during winter than summer ; contrary, I presume, to the nature of other putrid diseases. Their diet is at the same time low and scanty ; they are generally without firing ; and the powers of life soon become incapable of resisting so many causes of sickness and despair. .

"On my visits in 1779, I found only one person ill of the gaol-

fever ; he was in Newgate under sentence of death. In 1782 I did not find a single person labouring under that disorder throughout the whole kingdom. But in 1783, when the prisons became crowded in consequence of the peace, I was sorry to observe that, through the original faulty construction of many of them, and the want of attention in magistrates properly to inspect them, and enforce the orders of the Act for preserving the health of prisoners, they were beginning to return to their former wretched state."

In more than one place Howard dwells on the important observation that confinement alone, that overcrowding alone, was not sufficient to light up the specific gaol-distemper. There was wanted for it some specific cause ; then it spread like fire, and, fed by the impure condition, became a plague before which the officers of the courts of justice, the members of the Bar, nay, the Bench itself, sometimes fell.

Construction of Hospitals.

"The situation of an Infirmary or Hospital," he tells us, "should be on elevated ground, near a stream of water, and out of a town. The wards, if only one for each sex, from twenty-five to thirty feet high, arched, and without apartments over them ; otherwise, the building to consist of only two stories beside the cellars, and the area extended as far as necessary upon this plan, that the inconvenience of higher rooms may be avoided. The first floor raised four or five steps from the ground, and the ascent made easy to the entrance. The wards fifteen feet high to the ceilings, and distinct ones for medical and chirurgical patients. Two doors to each ward, one of them iron latticed, or canvas. Staircase of stone, spacious, convenient and easy, as in Italy, Marseilles, Malta, etc. No room to contain more than eight beds. The windows lofty and opposite, or large circular apertures (as at Leeds infirmary), opening into passages not less than six feet wide : hasps and staples to the upper sashes to prevent their being shut at improper times : one of the windows should open from the ceiling to the floor, either as folding doors, or like those at Guy's Hospital : a stone gallery for more readily opening and shutting the windows, as in the Italian hospitals. The ceilings lathed and plastered, and proper apertures in them. The fireplaces in the middle of the longer side of the wards ; the beds in spacious recesses, as at Toledo and Burgos ; or to each bed a recess with curtains, as at Genoa, Savona, etc. The bedsteads iron, painted,

and with a screw, that the backs may be easily raised or lowered ; the beds on varnished boards or laths, with hair mattresses. In each ward a cistern, basin, and towel for the patients. Vaults on the outside of the wards and water-closets, as at Guy's Hospital ; for every improvement that may render such places less offensive should be carefully adopted in all houses containing a number of inhabitants. Airy rooms and refectories for convalescent patients ; one spare and unfurnished ward, each ward to be taken in succession, and called the spare ward. The kitchen, wash-house, brew-house, and bake-house, out of the house ; but if the kitchen be in the house, it should be lofty, as in Christ's Hospital (not underground), and the entrance through the servants' hall. A convenient bath with an easy descent into it. A piazza and spacious walk to induce patients to take the air and exercise. The wards washed once a week—scraped and lime-whited at least once a year. The machines at Northwich for supplying the salt mines with fresh air, being on a simple construction, would be of admirable use in hospitals, especially if situated in close and confined places. The patients washed at their admission in the cold or warm bath, and to conform strictly to the rules of nicety and cleanliness.

“It may be proper to suggest, that many of these ideas may be adopted with equal propriety in the construction and regulation of poor-houses.”

Education in Ireland.

“I cannot forbear,” he continues, “expressing a wish that the benefits of education were more generally extended over Ireland than they are. If free-schools were instituted in every parish for instructing in the lower parts of learning, and the principles of morality, to children of each sex and of all persuasions, it would perhaps more than anything tend to soften the manners of the Irish poor, and enable their youth to resist the various temptations to vice, to which they are inevitably exposed in their crowded huts and cabins.

“The lower class of people in Ireland are by no means averse to the improvement of their children. At the cabins on the road I saw several schools, in which, for the payment of 3s. 3d. Irish per quarter, children were instructed in reading, writing, and accounts. Some of these I examined as to their proficiency, and found them much forwarder than those of the same age in the charter schools. They

were clean and wholesome, and consisted of the children of both Protestant and Catholic parents. I hope I shall not be thought, as a Protestant dissenter, indifferent to the Protestant cause, when I express my wish that these distinctions were less regarded in bestowing the advantages of education; and that the increase of Protestantism were chiefly trusted to the dissemination of knowledge and sound morals."

The above is but one of many quotations in which it was maintained that education was the great curer of national misery. Howard was specially strong in his belief that sound and free education was the most powerful of all aids for mental as well as physical evils. Crime and disease, in his view, went hand in hand.

Bad Effects of Alcoholic Drinks.

"Art," according to John Howard, "never made so fatal a present to mankind as the invention of distilling spirituous liquors; and they are seldom or never a necessary, but almost always a pernicious article in the diet of men of health. I cannot but look with peculiar satisfaction on the confirmation this opinion receives by the events in these narratives.

"The temporary glow and elevation caused by spirituous liquors are, I imagine, very fallacious tokens of their good effects, as they are always succeeded by a greater reverse, and tend rather to consume and exhaust, than to feed and invigorate, the genuine principle of vital energy. Another extremely pernicious effect of these liquors is the indolence and stupidity they occasion, rendering men inattentive to their own preservation, and unwilling to use those exertions which are so peculiarly necessary in situations like those described in the foregoing narratives."

If evidence of the value of abstinence as inculcated above were further wanting, we find it in the life and exertions of Howard himself. In all his travels, in all his dangers—and travels and dangers in his day were indeed serious—in all his anxieties, sorrows, difficulties, he kept up a strong heart, a serene mind, and a courageous activity under the most rigid rule of abstinence from all pernicious stimulation.

Shortening of Life by Gaol Confinement.

The gaol at Chelmsford he describes as "whitewashed and clean. No bath. Acquitted prisoners are kept in irons till the judge leaves

the town, unless the fees to the clerk of the Crown be paid. Forty convicts here (some of whom had been under sentence of transportation three or four years) regularly receive the king's allowance of 2s. 6d. a week. In many other gaols the convicts have only the county allowance; and several gaolers have observed, that when released after long confinement, they seldom live above a year or two."

LAST DAYS OF JOHN HOWARD.

In the quotations given above we learn a little respecting the sanitary labours of Howard. It is indeed a little, but it is a good specimen of the work of the man to whose last days we must now speedily come. His whole life was in the end devoted to travel, and to examinations of gaols, penitentiaries, poor-houses, and homes of the poor in great and crowded cities. He was not content with England and Ireland, but must needs pass on to the continent of Europe and traverse that continent from one point to another, shunning no danger, avoiding no fatigue. His mode of life, simple to such a degree as to be a wonder to the wealthy in those days, was by no means penurious. When he came to a town he chose the best hotel, and ordered the best meals that could be obtained, but he himself ate no flesh and drank no strong drink. The table was laid out for him as if he were going to dine sumptuously, on one condition, that no one was allowed to wait upon him except his servant, Prole, who, as soon as they were alone, removed all the viands to the sideboard, and made his master a bowl of bread and milk, which was considered amply sufficient for all his needs. Travelling about forty miles a day, he carried with him some dry biscuit, which, with some milk from a cottage, or a draught of fresh water, for which he would pay as he went along, he was perfectly content. At the different places where he stayed to inspect prisons, at home or abroad, he entered into all dangers without a thought of his own safety. Fever did not alarm him; fatigue and inclemency did not affect him; the passions of prisoners gave him no anxiety; and, although he was always courteous to authorities, from servants and officers to ministers, kings and emperors, he never hesitated to speak his mind and tell the truth at all risks. These self-sacrificing and courageous traits gained for him universal respect. He told his full mind: he showed to those who ruled how they made crime and afterwards punished it—a proof that they themselves were the

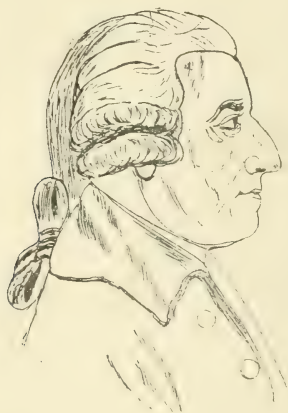
authors of crime rather than the removers of it. It would, perhaps, not be fair to say that he was completely emancipated in his views on the subject of punishment : he does not seem to have been prepared for the abolition of capital punishment, but he fought valiantly for the reduction of it as a practice, and opposed torture with his whole heart and soul.

Once in the course of his life he was led away by the political mirage. He was tempted to stand for Bedford with Mr. Whitbread, and, most fortunately, was defeated ; for certain it is that if he had entered Parliament some of the grandest achievements of his life would have had no existence.

Keeping him in our minds as a wanderer in the world, always for some great and beneficent object, we follow him until July 1789, when we find him leaving this country for a final tour on the Continent. He reaches Russia, and arrives at Kremenschuk on the Dnieper, and thence to Cherson in Russian Tartary, where he hears with delight of the fall of the Parisian Bastille. At this time fighting was going on between the Sultan and Imperial Russia. There had been a great Russian victory, and Cherson was rejoicing. But victory was attended, as is so often the case, with a furious outbreak of disease, and amongst its victims was a young lady who lived about twenty-four miles from Cherson. Her life was in the balance, and Howard, as if he were a real physician, was summoned to her bedside, at the special request of his friend Admiral Mordvinoff, who accompanied him. The young lady seemed to improve under his treatment, and he returned to Cherson. He was called again to her aid, and, amidst fearful storm and rain, set out once more on his mission of mercy, riding a dray-horse because he could get no better means of conveyance. On his arrival he found his patient in the hand of death, but he stayed with her for some hours, returning to Cherson afterwards, apparently but little indisposed. Gradually he began to suffer at intervals from pain, and finally lapsed into fever, from which he died. His last act was the perusal of a letter, sent from a friend in Leicester respecting his son. The letter said that the boy had greatly improved. "Is not this comfort for a dying father?" was the last connected sentence of the dying philanthropist.

In person John Howard was not a strong man in appearance, yet his strength was persistent in a measure little known. His appearance will be gathered from the portrait which forms the frontispiece of this biography. His modesty was such that he would never sit to a painter ; but one day, while seated in the chapel which he attended

in Bedford, now called the Howard Chapel, a fellow-worshipper drew a sketch of him, which has been preserved with scrupulous care, and I am deeply indebted to the authorities of the Howard Chapel for obtaining permission for Mr. Drury Stowe, of Bedford, to take a photograph of it, from which the autotype. To my good friend, Mr. Rowland Hill, of Bedford, I am also indebted, not only for assistance rendered in regard to the photograph, but also for the subjoined sketch of another portrait prepared for the *Bedford Mercury*, and published on the day following the unveiling of the Memorial.



PORTRAIT OF JOHN HOWARD FROM THE *BEDFORD MERCURY*.

All men have enemies, the best men as well as the worst, and John Howard did not escape. "Be thou pure as snow, thou shalt not escape calumny." It was urged against him in the calumnious way that he in his ardour for philanthropy neglected his son, an unhappy boy, whom he loved and cared for to the last. The more this story is looked into, the more certainly it fails to carry conviction. Young Howard was not for one moment neglected by a parent who laid down his life for his kindred, and whose love for all children of men was as great as his fame.

William Alexander Greenhill, M.D.

IT is not often that the opportunity occurs for enrolling amongst the great men in medicine one who has lived in our own time, and who deserves to be included among such a selected list as that which has appeared in these pages. But Dr. Greenhill, of Hastings, was in many respects so remarkable a man, and has added so much of the best learning to our medical and general literature, it were impossible to let his name pass out of immediate memory without a fitting tribute to him and his labours. He was a man who was great all round: a literary scholar; a practitioner of medicine; a veteran sanitarian. I have known him intimately since 1855, when he became a contributor to my old *Journal of Public Health and Sanitary Review*. To him, during that long period of forty years, I could refer for any particular information that might be at his command; and from him I always received the assistance needed. Not infrequently, also, he did me the honour to refer for suggestions on various points upon which he himself was engaged, and in which he thought I might render him, in return for his services, some little service of my own. It was a long interval of friendly companionship, a friendship never for a moment broken or to be forgotten.

Dr. Greenhill first saw the light at Stationers' Hall on the first day of the year 1814. His father was the principal executive officer (Secretary) in that famous institution, and there the boy received his rudimentary scholarship. In the year 1828 he went to Rugby, the year in which Dr. Arnold entered upon his duties as head master. "I entered Rugby," he once laughingly said to me, "when you entered the cradle, and I hope you enjoyed your life as much as I did mine." Like many other boys, he formed the most sincere attachment for Dr. Arnold, and formed such a fine estimate of the character of that illustrious teacher, it is much to be regretted that

his description of him is not left more extendedly on record. He remained at Rugby till 1832, and then, after winning an Exhibition, he went up to Trinity College, Oxford. From what he told me personally, I do not consider that he formed any great attachment to Oxford, as a school, nor to his classical studies there. He considered that what he was taught was narrow, stilted, and difficult, without being progressive; and he contrasted, with much feeling, the good effect of the teaching of Dr. Arnold compared with the influence of university teaching. He consulted Arnold on the subject of university work, and received from him very sound and seasonable advice.

When the choice of a profession came before Dr. Greenhill he chose medicine, and putting aside attempts to obtain other degrees, took in 1840-41 that of M.B., following it up by the degree of doctor of medicine in 1842, and settling himself to the practice of medicine in the city of Oxford. Why he took medicine as a study and a practice it is somewhat difficult to explain. He told me he did not go into it from the first as a profession in which he intended to make himself particularly eminent, but that, taking it altogether, it suited his quality of mind best. There were certain reasons why he did not feel he could enter the Church; he did not care to enter the Law, to plead good or bad causes according to his instructions; and he had no taste for commercial life. He had artistic likings and a decided turn and tendency for literature; but literature in his student days was nothing by which to live, except in case of a man who had a particular genius for engaging the popular mind, and this was not his strong point. He was a scholar; a biographer; by nature an historian. In a certain sense, he had very strong descriptive capacities, but he did not write in such a form as to be fascinating to the public taste, and there was a certain want of that imaginative and ideal presentation of mental work that was necessary for immediate success.

Although Dr. Greenhill became connected in the first place with medicine, after the manner described, he was, as might be expected, a conscientious and devoted physician. He was attached as physician to the Infirmary at Oxford; gained a very fair practice; and while in practice there married Laura Ward, a niece of Dr. Arnold. I doubt not that the duties of medicine occupied his first thoughts, but his diary, which at this moment lies before me, tells that more than medicine entered into his mind. I note the first passage. "1846, April 18th, Saturday. I propose for the

future to keep a register of my doings in this place, the time of my coming and going, and the way in which I am employed here, in the expectation that it may perhaps hereafter be interesting to refer to in a literary point of view, and also in the hope that (with God's blessing) I may hereby be rendered more and more watchful over my time. May I have grace to conduct my work as in God's sight, and direct it to His glory and the welfare of my neighbour." At the moment when that passage was written, for his own private meditation and as a test of himself in after years, he had no expectation that, half a century later, it would see the light; for he was a nervous and reserved man, looking forward for the recognitions that were to come, rather than for the immediate publication of things that concerned his own identification as one of the moving and obvious powers of his own generation. I quote it as a passage showing the true soul of the man, his inner self, at a moment when he was just becoming a medical scholar, reading up the life of Cheyne, studying Rhazes, and, for matter of modern literature of a medical type, Brodie's lectures on pathology. At this early time Cheyne and Rhazes very much occupied him. Cheyne's was a life of considerable interest, not extremely difficult to follow; the life of a man of eccentric parts, but of genius and common sense, with just a touch of dry humour, which his critic enjoyed at all times. Rhazes was a harder study, involving Arabic, and respecting whom he drops on a new volume of Ibn Khalliken "just in time to be of use. *Laus Deo.*" At this early period, also, he was looking out translations of Hippocrates for Adams of Banchory, was collating an Arabic MS. for Dozy of Leyden, consulting with Strickland about Aristotle, looking up details respecting Sydenham, preparing articles for Smith's *Dictionary of Greek and Roman Biography*, and preparing to conduct an examination at Harrow.

Greenhill's life in these years, and unto 1848, must have been a life of dream amongst the classical dead. For Smith's *Dictionary* he was ever busy, and in some of his lives, contributed to that work, he was evidently fascinated above the ordinary. Synesius was one of the men who gave him special pleasure; he finished it on June 14th, 1848, with the remark in the diary: "An article which has given me a great deal of trouble, but which has also given me several delightful proofs of God's goodness to me, for without His special assistance in many points, I should have made the article imperfect and erroneous."

The mode of expression here conveyed shows that the author was imbued with intense religious feelings, a fact which my own personal intercourse with him in later years never for a moment discovered, nor even suspected. Towards all such feelings he seemed to me negative, and he certainly never conveyed them. They were the secret outpourings of a heart that was truly sincere; and they who may feel them least themselves are bound to respect them, if for no other reasons than for their concealment in perfect sincerity.

In August of 1848, date 29th, he records that he was looking for a passage in St. Augustine for the prayers for the medical profession, which he afterwards published; and on November 14th of this year he began to translate the Arabic version of Galen, or, as he afterwards called it, the *Arabic Galen*. For a long time his diary is filled with daily references to this grand work, which was to him ever afterwards a fact and remembrance singularly grateful. I believe there was nothing that pleased him more than any reference to this early literary love. "Worked at *Arabic Galen*" is the regular entry, varied on January 19th with a diversion for a brief interval of the day, with "canvassing about the election at the Infirmary for twenty minutes." In July 1849, work at Galen began to slacken, to be replaced on the *Population of Oxford*, on Percival's *Medical Ethics*, and on Burton's *Anatomy of Melancholy*, which led him into the year 1850.

As 1851 approached, he began to see his way towards leaving Oxford, and removing to Hastings. His health seemed to demand the change. To the very last he laboured on assiduously in the Bodleian, not infrequently, however, falling asleep for twenty minutes or so over his labour. On Tuesday, March 7th, 1851, he closes his diary as follows:—

"Removed my papers; gave up the key of my desk; read for the last time Psalm xxiii., which has for so many years been my daily comfort among all my labours in this place. Henceforth I shall visit the Bodleian only as a stranger; but thanks be to God for all the mercies vouchsafed to me, here and everywhere. Amen."

If we turn to the short Psalm xxiii., we see the bent of his mind: "The Lord is my shepherd; I shall not want," and so on through one of the most perfect poems ever composed by mortal man.

Before I leave the reference to my friend during his long Oxford career, it is right I should notice one or two other facts which bear materially upon his life. I should state that in 1836-7 he left Oxford and paid a visit to Paris, where, for a time, he studied medical



W. A. Greenhill,

From a photograph by H. J. Gullisoll, and its similar
autograph.



science and practice. His residence there was not very prolonged, and from an observation he made about it to me, bearing on an essay of my own relating to the life and discoveries of Laennec, I rather infer that he was not greatly impressed by the Parisian schools of his day. He certainly did not consider them in any way superior to the English and Scottish schools of medicine. France, in fact, did not seem to agree with him, and his residence in the French capital may be considered rather as a holiday, or diversion, than the serious part of a medical student's academical career.

There are some details of an extra-medical kind which occurred to him while at Oxford. He lived there in a critical and remarkable period, during which a religious, or rather theological, discussion and practice were in the birth of revolution. Dr. Newman, afterwards the famous Cardinal, was, during Greenhill's period, Vicar of the well-known St. Mary's Church, and Greenhill, who lived opposite All Souls' and St. Mary's, was churchwarden to Newman, and remained so until the latter gave up his living. The two men were at that time close friends, and although for many years afterwards they entered into no direct personal communion, they remained friends until the Cardinal died. The teachings of Newman had, without any doubt, an influence on the mind of Greenhill, who had been an early member of Dr. Pusey's Theological Society established in Oxford in 1835. Beyond a transitory inclination towards the specific doctrines of Pusey and Newman, Greenhill, however, was not led away to any extent from the established doctrine, whatever that may be, of the Established Church of England. We might, perhaps, say now that he was rather "High" in his Church opinions, but he did not carry them to an extreme. He certainly was not of the Low Church, neither was he Broad, for on the question of Broad Church he differed so widely from his fellow-student at Rugby and Oxford, Dean Stanley, that he practically separated altogether from this old colleague, although retaining a most friendly feeling for him, and ever speaking of him as one of the grand lights of the day—a man of surpassing charm, force, and, to some extent, originality. I remember giving to him, incidentally, a little sketch of a New Year's dinner which I had with the Dean at the residence of the Hon. Mrs. Stanley—now Lady Jeune—and telling how the Dean amused us by the information that there was legal provision for an officer in the Church who should rank above an Archbishop—namely, the "Vicegerent in Ecclesiastical Affairs," who should hold a position between the Archbishop of Canterbury and Her Majesty; and how

we had laughed and said the Dean himself ought to be raised by Her Majesty to that position with re-establishment of the office. Greenhill was greatly diverted and impressed by the observation, declaring that, in all probability, the Dean was quite in earnest and quite correct; speaking of him at the same time as one of his old and warm friends, and asking many questions as to his appearance, his health, and the different other topics he would be sure to raise at table, with some good ghost story as a grand finale. It seems to me, not to make a long history of it, as might easily be done, that between Dean Stanley and Dr. Pusey, Dr. Greenhill steered a middle course, holding his own conscientious opinions, which were so inflexible that one of his biographers, since his death, has quoted, in respect of his conscientiousness, a saying applied to him in his youthful days, that "if it were proved to Greenhill that it was his duty to hang himself he would do it." This conscientiousness, combined with resolution, industry, and minutest attention to details, made him always a power, and commonly a very effective one, though sometimes a little wearisome.

In 1847, when Mr. Gladstone stood for the University, it was his good fortune to have the services of Dr. Greenhill as chairman of his committee. In this position he allowed party politics to play a minor part in the election, in so far as he was concerned. His admiration for the abilities of Mr. Gladstone, and for the brilliancy he would be sure to confer on the University as its representative member, led him entirely, and to his very last this admiration did not in the least degree wane. There was no man of whom he spoke with more feeling, or with greater emphasis of admiration, than of Mr. Gladstone. His sympathies were with the great statesman in every particular until Home Rule came across the scene. On this political question his natural aversion towards going into extremes led him into what he considered caution. He would not attempt to forecast anything in the future, nor even to hope that a radical change in the constitution would be of any lasting service. On the contrary, he feared that change of constitutional government, by which two parliaments would exist in the same kingdom, might lead to contentions that would know no end; and, he argued—I am speaking now from personal conversation, in which he knew that my opinions were not his own—that, while every grievance should be removed from Ireland, the government of the two countries should be from one centre, leaving it to time to unite the two islands more intimately, by physical union, such as direct railway communication,

and by mental combination and heart. He thus became what is called a Liberal Unionist, and he wrote a gay letter to me when I lost a seat for which I tried at Walton, Liverpool, congratulating me on my real success—in a loss which would save me “time, labour, and life.” Still, though his views ran in an opposite direction to those of the great parliamentary chieftain, his recognition of the tremendous powers and far-seeing intelligence of that chieftain never slackened. “I think he has for once gone astray, but I only think,” was his severest criticism.

I am not at all sure that the Tractarian movement had not something to do with the removal of Greenhill from Oxford to Hastings. Reasons of health, there can be no doubt, had much to do with the change of residence ; but what amount of physical disorder led to it it is not easy to say with precision. He was a man who never liked to be thought ill, or to have anything like “fussation ” made about his health and strength. He was a man, also, of a retiring nature, who got wearied of controversy, and of that kind of personal controversy which leads, if not to bad, to painful feeling and argument. He, therefore, got tired of Oxford, of the controversies going on in it, and of beginnings the ends of which he could not clearly foresee, into the spirit of which he was not strongly inclined to enter. His inclinations, therefore, physical and mental, were for a new sphere, and he believed that Hastings, a home on the shore of the sea, where, he was accustomed to say, there were several climates according to location, would suit him. Hastings tempted him most ; and, his mind made up, he settled for life in the place he had chosen. He took up residence, in the first instance, in Carlisle Parade, Hastings, and, apart from his medical and literary work, helped in public work as in the building of Trinity Church, and in the organisation of the parochial duties belonging to that establishment. He went with the determination to practise as a general physician, and purchased the practice of Dr. Mackness, a practitioner who had been for many years in the town, who was held in great esteem, was considered by all a sound man, and who, from taking part in various philanthropic works, had earned the reputation of being a philanthropist ; an accomplished gentleman, worthily ambitious to do many things that would improve Hastings, but who, being before his time, only partially succeeded in his meritorious endeavours.

My own acquaintance with Dr. Greenhill commenced at Hastings some little time after he was well established there. In 1855 I

published the first number of the *Journal of Public Health and Sanitary Review*. This was a venture novel of its kind, and in fact was the earliest periodical sanitary work published in this country. I commenced the preparation for it twelve months before it appeared, and had correspondence with most of, perhaps I may say all, the well-known sanitary men then existing in this country, amongst others Dr. Greenhill, whose labours in regard to Oxford had greatly interested me. In addressing him I explained the design of the work, and took his opinion upon it. To my great delight he wrote me a most friendly and thoughtful letter, agreeing warmly with the plan of the journal, and commending especially a department named to him including reports on cities, towns, and districts, with their average mortalities and conditions of health. He promised me that he would contribute at least one short paper in this department, with special reference to the town in which he had recently become located, namely Hastings, and in my first collection of manuscripts for Volume I. of the journal, I held a paper from his pen, in which he carried out the promise he had made, adding a second communication later on. He opened by observing that while the health of every town, or village, concerns its own inhabitants, there are many places whose sanitary conditions may be supposed, for certain reasons, to be interesting to the whole community. He considered that Hastings was one of these, on account of the great number of invalids who annually resort thither, especially during the winter season. In continuance of his report he indicated that the average rate of mortality in Hastings, according to his own calculations, might be reckoned at either 18.39 per thousand, or 18.87 per thousand, according to the mode of estimating the population. The last estimate was, in his opinion, most probably correct, and was therefore adopted by him. The highest rate of mortality was 28.23 per thousand in 1849, that being a year in which Asiatic cholera had been very prevalent. The lowest mortality was 15.80 per thousand in the year 1854. In females the highest mortality was 22.96 per thousand in 1849; and the lowest 15.14 per thousand in 1854, the average from 1849 to 1854 being 17.63 per thousand. The deaths amongst males were more numerous, and the death-rate, including both sexes, for one decade, 1845-54 presented the average of 20.32.

With his usual keen analytical sense Greenhill pointed out that the mortality in the sub-districts of Hastings was not what might have been at first sight expected. He was prepared to find the

fewest deaths in one rural sub-district called Ore, but the mortality was, in fact, rather higher in this than in either of the other two sub-districts, being 19'61 per thousand. Tracing out the cause of the higher mortality, he found it depended on the deaths in the Union Workhouse situated in this sub-district. Again he expected to find the mortality in the sub-district of All Saints, the oldest and poorest part of the town, higher than in the newer and more fashionable sub-district of St. Mary in the Castle. To his surprise the reverse was the fact; the deaths in the older district being 18'48 per thousand, and in the fashionable sub-district 19'00 per thousand. Searching into the cause for this variation, he traced it to the mortality occasioned by the large number of visitors who died at Hastings, most of whom lodged in the better parts of the town.

In the course of this short report he made a very good observation on the matter of the natural and philosophical division of the year into seasons, for medical and sanitary purposes. He considered that division into seasons is far more important than the arbitrary and official division into quarters. He took December, January, and February, as winter; March, April, and May, as spring; June, July, and August, as summer, or the hottest period, and September, October, and November as the autumn. The average mortality was lowest during the summer, namely 15'92 per thousand. It increased in the autumn to 18'29 per thousand. It rose in the winter to 19'45 per thousand, and reached its maximum in the spring at 21'62 per thousand. These observations in respect to seasons are rigorously correct, and should be followed up by all statisticians who wish to be precise on the subject of the relation of season to disease. The greatest number of deaths observed by Dr. Greenhill in Hastings was caused by tubercular disease, and by the zymotics. The mortality from tubercular diseases, especially phthisis, varied but little in the various season. The deaths from the zymotic class were most numerous in the autumn, but in the winter and spring the number of deaths was much increased by diseases of the nervous system and diseases of the respiration.

From the commencement of our literary and scientific friendship Dr. Greenhill and I became connected very closely almost up to his death. But I did not personally know him until the year 1857. In the latter part of February or beginning of March in that year I was at Hastings on my wedding trip, and thought it only right to call upon one who had so warmly interested himself in my work, and who, in fact, had sent me every quarter a systematic statement of the

prevailing diseases of the town in which he lived. I had some little hesitation in making my first visit to him, for I was told that he was a very reserved man, and that sometimes he was very critical. Moreover, I have at all times a most painful diffidence in calling upon strangers. But just before I left Hastings I took my chance, and was so fortunate as to find him at home. He received me with the greatest kindness, and lent me, I should think, an hour or more from his much occupied time. I said little, but heard much, and was deeply interested in the extraordinary details into which he entered on subjects widely diverse. Of course I had been informed of his learning; that he was one of the best Arabic scholars in the country; that no one had used the Bodleian Library at Oxford more assiduously, or was better acquainted with its contents; that he read Latin and Greek with nearly the same facility as his native tongue; that he had contributed largely to Smith's *Biographical and Classical Dictionary*; that, in his early life, he had edited the *Physiology of Theophilus*; that he had edited the works of Sydenham in Latin for the Sydenham Society; and that, in short, he might be considered as the one distinct classical scholar in medicine. Perhaps he was pleased that I was content to learn from him, for certainly he never showed a trace of that reserve, coldness, or cynicism which some had led me to expect. He was then forty-three years of age, and in his prime; very active in his movements; very precise in his mode of speech; but at the same time full of good nature; witty, and quite enthusiastic on certain points of a physiological kind bearing upon the blood, on which he knew I had been for some time successfully engaged in my own lines of research. He was very particular in his inquiries about the London men of medicine who took a marked place, but with few of whom he seemed to be personally familiar. He was anxious in his inquiry about the work done by the Epidemiological Society, and considered that the venerable President of that Society, the late Dr. Benjamin Guy Babington, had contributed an immense service to English literature by his translation of Hecker's *Epidemics of the Middle Ages*. He had conceived a great admiration of Dr. Latham, and asked me many particulars about his fellow literary *confrère*, Dr. Robert Willis, with whom he knew I had been associated, and with whose translation of William Harvey he had made himself very familiar. I gathered from him that the learning of Willis impressed him, that he had the greatest respect for the Harveian work, and that they had a sincere esteem for each other. Then we got into conversation on the progress of sanitation, which he con-

sidered ought to engage the minds of all men and women, whether they were medical or otherwise ; and he was good enough to refer to a paper of mine in the *Sanitary Journal*, on *Prevention and Cure* as being very acceptable to him and in accordance with his own views. Before we parted we came to the discussion of some points bearing on practical medicine, during which he disclosed to me, briefly, but with singular lucidity, that his wide practical knowledge, though he seemed to hold it somewhat in disregard, was quite marked as an accomplishment, and that his love of books of antiquity was not so unkind as to separate him from the medical studies of the current hour.

WORKS OF DR. GREENHILL IN LITERATURE.

It is almost impossible to give too high a place to Dr. Greenhill as a medical scholar. It is probable that, taking him all in all, we never had in medicine so remarkable a scholar, one possessed of such classical erudition. I reckon up, without rising from my chair, a number of works on which he was critically engaged, which, after passing through his hands, would take many years of labour even to read. There is the edition in Latin of the *Translation of Theophilus* ; the Latin edition of the works of Sydenham ; the *Polyglot Syllabus of Medical Nomenclature* ; the *Treatise of Rhazes on Small-Pox*, translated from the Arabic ; the numerous contributions of medical biography, from A to Z, in *Smith's Biographical Classical Dictionary* : the careful and beautiful edition of the *Religio Medici* of Sir Thomas Browne ; the *Prayers for the Use of the Profession of Medicine* ; the contributions to the *Volumes of National Biography* ; the article on *Leprosy* in the *Popular Educator* ; the essays on the health and mortality of Hastings in the *Journal of Public Health*, and in the *Report of the Hastings Health Congress* in 1889 ; the *Contrast, Duty, and Pleasure of Right and Wrong* ; and the inquiries supplied to the Sussex Archæological collections ; to say nothing of various incidental letters, notes, short papers, and addresses which have not been preserved, but which were often of great value.

We have had some men in medicine who compare with him—namely, Sprengel, Freind, Robert Willis, Adams, and Mason Good—but I somewhat doubt whether they reached his unusually high standard. His knowledge of Arabic was quite peculiar in its way, and separated him from previous scholars ; while in Latin and Greek he was the equal of any of his medical predecessors. Again, we have to take into account the wide scope of his learning. It had,

perhaps, more of a biographical than a purely historical character, but biography is history, the very best of all, and he endeavoured to utilise it to the fullest extent. He was, I think, also very impartial in his readings of men and their writings. Some men, truly, he admired more than others. He was a great admirer of Percival, whose medical ethics seemed to have made a lasting impression upon his mind. He had the sincerest liking for Sydenham, whom he looked upon as the first living exponent of practical medicine after the renaissance. Of ancient writers Rhazes and Galen were his favourites, though Theophilus came in for a good share of favour. But I think of all men of the past whom he loved most Sir Thomas Browne stood, in his estimation, highest of all. His index to Browne's works *General and Glossarial*, is one of the most curious additions to the works of any author that I remember to have seen, and indicates how truly he must have loved his task. The preface, also, which he adds to the *Religio Medici*, conveys to the reader the tenderest feeling, the notices of former editors of the *Religio Medici*, with the chronological table of dates connected with the original work, forming a compact little work of themselves. Sir Thomas Browne seems to have been as familiar to Dr. Greenhill as Greenhill was to himself, and he appears never to have forgotten a single point relating to his favourite writer that provoked interest. I remember once speaking with him about the *Evening Hymns* of Browne and Bishop Ken, claiming for Browne that he stood before Ken, not only in the matter of date, but also in the matter of the simple beauty of the poetry. In the notes on the *Religio Medici* he touches on the same subject, at page 289, where he compares "the beautiful and well-known evening hymn of Bishop Ken with the hymn of the *Religio Medici*, beginning:

"The night is come, like to the day;
Depart not Thou, great God, away."

And he explains there, as he did to me, that as Browne and Ken were both Wykehamists they probably derived their inspiration from the same source—the *Hymni Ecclesie*, with which they must have been familiar. I could find in the notes on the *Religio Medici* any number of quotations of similar interest, but I really must not be tempted to do more than suggest to any *Æsculapian* brother of learned taste that he cannot spend a leisure hour better than in taking up Greenhill's edition of the *Religio Medici*, and comparing the author with the commentator. It will often be a trial to his judgment to discover who holds the first place.

Of some men considered eminent and truly famous he held original and opposing views. Jenner, for example, so much belauded by many, he told me he never could admire. He thought John Hunter industrious, but rested there; William Hunter was to him as distinguished a man as John, and he held me as correct in having written that both William and John were great, but William was the firstborn. Arbuthnot "was a fine fellow"; Xavier Bichat "grand."

His eye was peculiarly quick at any omission, technical errors, or accidentals in literature, and I was grateful to him for many critical notes which he was good enough to send me spontaneously. Here, for example, is a note I have had reproduced; it has reference to an accidental omission of a word in a quotation in one of the numbers of the *Asclepiad*.

Hastings, Nov. 19, '88.
 The omission of "longa"
 after "nova" spoils the
 verse, which is in Ho-
 race's Odes i. 28 at the
 end. W.A.G.

Another similar brief note runs as follows:

"Page 62. *The Gold-headed Cane* was written by Dr. Macmichael."

WORK AS A SANITARIAN.

As a sanitarian Greenhill began to figure about the year 1849, when the cholera broke out at Oxford. During the epidemic there

he took an active part in dealing with the disease, and he gave considerable assistance to the series of reports on the mortality and public health of Oxford, with its appendix containing the account of the cholera epidemic. This document was prepared for the Ashmolean Society, and dealt with the statistical facts in the possession of the authors. Dr. Acland, now Sir Henry, in his well-known work on the cholera at Oxford, published in 1854, spoke with great commendation of the labours of his colleague, Dr. Greenhill. Amongst other efforts of a sanitary kind, Greenhill endeavoured to induce the French Government to register the causes of deaths, after the manner of the English system, introduced originally by the late Sir Edwin Chadwick, and successfully planned and conducted by the late Dr. William Farr. He had an interview on this matter with the Minister of Commerce and Agriculture in France, M. Dumas, with whom he held a very interesting conversation, and so far influenced him as to induce him to form a Commission of Inquiry into the possibility of adopting the method—an inquiry abandoned, however, in consequence of the fall of what was then known as the Baroche Ministry. He afterwards, at an international and statistical congress at Paris in the year 1855, took part in the committee that had for its consideration the nomenclature and classification of the causes of death. Five years later, namely in 1860, at a meeting in London, he, jointly with Dr. Sutherland and the late Dr. MacWilliam, acted as Secretary of the Sanitary Department.

But it was in Hastings itself that Greenhill performed his best sanitary work. I have already recorded his estimates of the rate of mortality in the place, but I have not referred to the practical measures he undertook there in order to bring the vitality of the place to a better pitch than that in which it stood when he entered it. He found a beautiful locality presenting what he considered a very high mortality, owing to municipal neglect—indifferent drainage, indifferent water, and the bad housing of the people in the poorer districts. Mr. Edward Cresy, superintending inspector to the general Board of Health, had held an inquiry into the sewage, drainage, water supply, and sanitary condition of the town in 1850, and his report greatly influenced Dr. Greenhill, who thereupon determined that many of the evils complained of should no longer be existent. He urged, and not without effect, the improvement of the main drainage and water supply; he did more, he lent his own individual energy, with the assistance of a few friends, to improvements in the homes of the people. The result was the formation of the Hastings

Cottage Improvement Society, which has for about thirty-five years produced a considerable change in the sanitary condition of the town. To these labours may be added endeavours of a purely philanthropic character. It is inevitable when a man becomes a sanitarian that he becomes also a philanthropist, even though the subject of philanthropy be not specially a part of his nature, since all that is sanitary goes naturally to the benefit and civilisation of mankind. But Greenhill's tendencies passed beyond this mere necessity. He worked with spirit and without pretence at simple charitable aidances. He took an active part in the formation and support of the Mendicity Society, by which help was given to those wayfarers who entered the town and who had no fixed abode there ; and he was ready at all times to give his assistance and influence to charity in every correct phase of its development. In this kind of benevolence he was, as in his literature, extremely inquisitive and precise, which led some to say that he was too exacting even in charity. Certainly he was never gushing, and never accompanied almsgiving with the ornamentation of ostensible sweetness of disposition. He spelt charity in a clear, round, firm hand, without the slightest flourish ; but, on the plan of not proclaiming his acts from the housetops, he kept silently at work without letting his left hand know his right hand's labour.

There was, with it all, about him a conscious pride, coupled with a quiet self-consciousness of merit, which filled his nature. I recall vividly one happy day spent with him in Hastings, when he took me round to describe to me the great improvements that had been introduced in the dwellings of the poor by the H.C.I.S.—the Hastings Cottage Improvement Society. He described, from Cresy's report of 1850, what had then existed in the localities we were visiting—conditions not indeed fitted for animals of the lower creation ; and as he showed me what now actually existed he was almost enthusiastic at one moment on the vast improvement that had taken place. In a more subdued tone he added, " I fear that in your sanitary eye, and with your ideal fancy of Hygeiopolis everywhere, you are not very much satisfied even with the present state of things ; neither am I, but I assure you the improvement, by contrast, stands out boldly, and for the moment is a fact of advancement which brings much hope with it in the moral change for the good of the people, the reduction of mortality, and the better health and comfort that prevail." A few days afterwards he wrote me a note saying how pleased he was that I was so contented with what he had led me to see, and hoped it was " real content," " not mere courtesy," I had spoken.

WORK AS A PRACTICAL PHYSICIAN.

Greenhill held in medicine three important public positions. He was Physician to the Infirmary at Oxford, to the Infirmary at Hastings, and the Hastings Home for invalid gentlewomen. He was for a time honorary secretary to the Medico-Chirurgical Society of Hastings and to the Sussex Medical Friendly Society. In these positions he was in the right place, and held them with distinction. I have heard it said, however, that he was a scholar—which could easily be said without thanking any one for saying it—but was not a practitioner. The criticism is one from that fool's calendar which is more easily and readily spoken than proved; one recalling the fact that it is the custom of the dull idiots in every art to declare, as a sort of cover to their imbecility and ignorance, that "they do not pretend to be learned, because they are practical men." Greenhill knew these gentry right well, and set his teeth at their complacency very hard indeed. I wish some of them could have heard him. In point of fact he was a very true and sound practitioner, cautious in prognosis and exceedingly cautious in prescription. His very precision was, to the vulgar, his failure. Having, professedly, spare originality in devising means of cure, he was critical to a degree of many means that were proposed, holding fast only those which were proved to be good. He considered it morally wrong for anyone to put so-called active medicinal substances into a human body for the mere sake of doing something and of appearing to help the sick person by such blind treatment. The plan, he admitted, often answered in a worldly point of view, but he had no sympathy with worldly points of view alone, and would rather be poor with precision than rich with *ad captandum*.

A FINAL CHAPTER.

It is very hard to write even a short notice of one who has been a friend and fellow-student for so many years. It is difficult to stop and it is equally difficult to proceed. We measure our lives by the lives we think of most dearly, and although Greenhill was many years older than I, the loss of him is as the toll of a bell heard at a distance not too far away to be indistinct. He was never in our time what is considered a popular man, never a notoriety, never an idol; but—

"Let not my love be called idolatry,
Nor my beloved for an idol show"—

I candidly believe that in the solemn future he will be one of the few

brothers medical who will sail visibly down in the current of the ages. The work he performed is of a nature permanent, and little as it has seemed adapted to the mind and temper of his time, it is destined for a nobler time as a light that will live. Greenhill had his anxieties, his domestic sorrows. His first daughter died of pulmonary consumption; his son, an Oxford student, died after a surgical operation; and his wife, broken down by these painful events, quickly followed them. These griefs depressed but did not vanquish him. He retired from practice to find a sweetly quiet home in The Croft, Hastings, a beautiful home, which all who visited it will long remember; a home endeared by the gentle and loving kindness of his daughter Kate, his housekeeper, his all in all. In 1880 a memorial presented to Mr. Gladstone, and which had two years before been unsuccessfully laid before Lord Beaconsfield, praying for him a modest Government pension, met with a favourable response, and in the last decade of his life he had what he desired of all things most, rest in work, work congenial to his literary taste and lasting fame.

A few years ago, being in London on a visit to his attached friends, Professor and Mrs. Tweedy, he called upon me, and consulted me about a deafness from which he suffered. A trifling operation was followed by much relief, but he was then aware that, as he expressed himself, "the sand was running out fast." Yet his spirits remained high, his love of learning untarnished. He continued the same up to Tuesday, September 18th, of 1894. On that day he felt rather tired, and on Wednesday morning, September 19th, 1894, seized with a difficulty of respiration, to which he occasionally had been subject, he sank, in his eighty-first year, beneath the load of life, and died—before medical aid could be obtained—ready to exclaim with Tully: *O præclarum diem, quum ad illud divinum animorum consilium cætumque profisiscar quumque ex hac turbâ et colluvione discedam!*

John Abernethy, F.R.S.

AMONGST the people there is perhaps no medical name so commonly known as that of John Abernethy, and on the first of May of this year (1895), when there was a *conversazione* at St. Bartholomew's Hospital to celebrate his centenary, no name seemed more familiar to the assembled guests. In the great hall of Bartholomew's there is a fine portrait of the man, which, decorated modestly and with good taste, stood out prominently; but so strong a personality has Abernethy left it almost seemed as if he himself were still present dominating over the assembly and settling the knottiest points by the force of his opinion.

In biographical history those persons exercising special influence over their compeers are of singular character. Their influence is all-pervading and persistent. They may not be great of the greatest; they may do little that is really original and lasting; but they live on. I asked more than one well-informed neighbour, "What is your sense of comparison as between Abernethy and his cotemporary Thomas Young?" They furnished no comparison. To them Young was a negation, Abernethy an affirmation, and that is just the difference. Between the two men there was the distance of the two mental poles. Young was a genius of the polar type, a sun too distant to be understood, deciphering a language that had been for ages dead, and readable only in ancient symbol. Abernethy, doing in singular form what was really commonplace work, work of the earth earthy, was nevertheless heard and understood by all who knew him, was always cutting his name deep in the minds of his cotemporaries, and transmitting it through them to their successors.

It is fortunate for biographical history that we have the life of John Abernethy very neatly written by one who knew him well, the late Mr. Thomas Joseph Pettigrew, F.R.S., a man I more than once had the pleasure of meeting in my early life. It is also fortunate for



J. Abernethy

From a rare engraving: Life about the year 1800. Artist unknown.



me that two others who were acquainted with him, namely, the late distinguished Professor Sir Richard Owen, and the late eminent Dr. Robert Willis—for many years librarian at the Royal College of Surgeons—and three patients who had been under the care of Abernethy, have all recounted to me anecdotes in respect to him, with a good many stories of his eccentricities, about which a little more further on.

Pettigrew says, from his direct knowledge, that Abernethy was born in London on the site of what is now known as Finsbury Circus, and that the year of his birth was 1765. He adds that Abernethy's father was a native of Scotland, his mother of Ireland, and that his uncle, a literary man, was known as an author of some tracts and sermons, which have lived on, although mere curiosities, into the present day. As a boy Abernethy does not seem to have passed through anything like a classical education; he was placed at a school in Lothbury, and was brought up under a teacher by whom classical lore was little esteemed. He was "apprenticed," as it was then termed, to Mr., afterwards Sir, Charles Blicke, one of the surgeons of St. Bartholomew's Hospital, and he attended the lectures of Sir William Blizard, Mr. John Hunter, Mr. Hewson, and Mr. Falconer. He probably also attended the clinique of Mr. Pott, who was one of the surgeons to St. Bartholomew's Hospital. On the retirement of Pott from the hospital he became assistant surgeon, and remained in that position for twenty-eight years. Soon after his appointment as assistant surgeon he began to lecture, at the hospital, on anatomy and surgery, laying the foundation of that St. Bartholomew's School which has since become so famous in medical science. In his day medical teaching was divided between what may be called a more or less complete hospital school, and a system of teaching carried on by individual men, sometimes at their own homes and sometimes at the hospitals with which they were connected. About the time when Abernethy was at his prime, the London Hospital seems to have taken the lead as a school, but many private lecturers had good classes. It is curious to read the announcements of the courses as they then appeared. I turn to a page or two of advertisements of the session of the year 1806, and find that Practice of Physic was taught by Dr. Cooke at the London Hospital; Chemistry by Dr. Hamilton and Dr. Yelloly; Medicine and Materia Medica by Dr. Frampton; Midwifery by Dr. Dennison; Anatomy, Physiology, and Operations of Surgery by Mr. Headington and Mr. Frampton; Demonstrations of Dissections by Mr. Armiger; Surgery by Mr.

Headington ; Clinical Surgery by Sir W. Blizard and Mr. T. Blizard. This was a complete school for its day, and ran as a rival with the Medical Theatre at St. Bartholomew's Hospital, where Anatomy and Physiology were advertised as by Mr. Abernethy, and the Theory and Practice of Surgery by the same teacher. Here also Drs. Roberts and Powell taught Practice of Medicine ; Mr. Macartney Comparative Anatomy and the Laws of Organic Existence ; Dr. Edwards, Chemistry ; Dr. Thynne, Midwifery and Diseases of Women and Children ; and Mr. Lawrence, Demonstrations in Practical Anatomy. At the same period Dr. Badham gave his separate course of Medicine and Chemistry ; Mr. Joshua Brookes his spring course on Anatomy, Physiology, and Surgery, at his Theatre of Anatomy, Blenheim Street ; Dr. Clarke his lectures on Midwifery and the Diseases of Women and Children, at the house of Mr. Clarke, 10, Upper John Street, Golden Square ; Mr. Chevalier, Principles and Operations of Surgery, at his house in South Audley Street, Grosvenor Square ; Mr. John Pearson, Principles and Practice of Surgery ; Dr. Reid, the Theory and Practice of Medicine, at his house, Granville Street, Brunswick Square, or at the Finsbury Dispensary, St. John's Square, Clerkenwell ; Mr. John Taunton, Anatomy, Physiology, and Surgery, at his theatre, Granville Street ; and Dr. Marshal, similar subjects, in Holborn. All these teachers have not only passed away, but have ceased even to be remembrances, with the exception of four—Sir William Blizard, Joshua Brookes, Mr., late in life Sir, William Lawrence, whom some of us personally remember, and the man whose life is now in hand, John Abernethy, who by the time here mentioned must have been a shining light. Abernethy, who was elected a Fellow of the Royal Society in 1796, started in practice in St. Mildred's Court in the Poultry, a part of the city in which he proposed living for seven years ; but he soon moved to Bedford Row, which he called the middle part of the town, and in which he continued to live during the whole time that he was a practitioner in London.

THE WORKS OF ABERNETHY.

A careful perusal of the works of Abernethy indicates how thoroughly he had become imbued with the doctrines taught by John Hunter, whom he knew, and who showed him favours, which, as a young man, he somewhat slighted, as he afterwards himself confessed.

Treatment of Lumbar Abscess.

Abernethy first became an author when he was thirty-two years of age, by publishing a series of papers entitled *Surgical and Physiological Essays*. The most important one was on Lumbar Abscess, in the treatment of which disease he introduced principles that have been considered as novel in these days, a kind of subcutaneous incision, and an antiseptic proceeding. He had observed that in opening a lumbar abscess, if the incision were made direct through the skin into the cyst containing the matter, and if the wound were left open so that the external cavity was exposed to the air, the remaining pus, after the abscess had been discharged, underwent decomposition, which led to continued discharge and to great irritation, ending often in a serious or even fatal condition. He therefore made a puncture into the cyst, discharged the matter through the opening, and then closed the opening in such a way as not to allow the wound through the skin to correspond with the wound that had been made through the cyst. In this way he prevented the entrance of air into the wound. The sac contracted without any decomposition, and cure seems to have been effected in a very considerable number of cases.

Another method he introduced was that of evacuating the contents of the abscess by small punctures, frequently repeated, whereby the sides of the sac gradually collapsed and adhered. Mr. Ricaud, giving an account of the cases treated at the Finsbury Dispensary in 1802, speaks warmly in favour of this method, declaring it led to good recoveries, whereas if the abscess broke spontaneously hectic and death were the ordinary results. Finding his first volume popular, Abernethy next published an essay on *Injuries of the Head*, together with particulars of *Experiments on Irritability in some Surgical Cases*.

On Aneurism.

In 1807 he startled the surgical world by curing a femoral aneurism, reaching as high as Poupart's ligament, by ligature of the external iliac artery. It was the first time so bold an operation had been performed, and the case is worthy of a moment's special notice.

The patient was a woman named Jane Field. She was aged forty years, and had been in the habit of drinking to excess. She was admitted to St. Bartholomew's Hospital with a large femoral aneurism,

reaching as high as Poupart's ligament. The whole of the limb was cedematous, and she was quite incapable of using the least exercise or of sitting upright. The pain was so violent as to preclude sleep. She had no appetite; her pulse was frequent and feeble, generally exceeding a hundred; but her tongue was not furred, and her bowels were regular. In operating, Mr. Abernethy made an incision three inches in length, through the integuments of the abdomen in the direction of the artery beginning just above Poupart's ligament. He divided the skin and aponeurosis of the external oblique muscle, and introduced his finger between the margin of the internal oblique and transverse muscles and the peritoneum. He then divided these upwards in the direction of the external wound, to the extent of one inch and a half, with a probe-pointed bistoury. Having thus made room for the admission of his finger, he put it down upon the artery, felt the pulsations, inserted the finger beneath the vessel, and, with the aneurismal needle, passed under it two thick ligatures, carrying them upward and downward as far as the detachment of the artery permitted, tying them firmly. He next divided the artery in the interspace, but nearer to the lower than to the upper ligature. The operation was entirely successful, and the patient had a good recovery.

In this operation Abernethy made an alteration in Mr. Hunter's method of tying an artery—namely, that he tied it in two places, and then divided the vessel between the ligatures, using a very thick ligature, on which method Mr. Cooper—afterwards Sir Astley—remarked that he thought the double ligature certainly tended to lessen the risk of hæmorrhage, but that there was a danger from the practice in that the ligatures were apt to slip off the ends of the vessel which had been divided between them; an accident of this kind happened to himself, and the patient would probably have died if he had been removed from the table. In order to prevent such an accident Cooper conveyed the ends of the ligatures, by means of two blunt needles, under the artery, excluding the vein and nerve, and passed the threads through the cellular membrane surrounding the artery. When these ends were tied and the artery divided between them, the ligatures were prevented from slipping from the artery by the cellular membrane through which the ends were passed. Cline, however, objected to the double ligature altogether, from the reason of the accident of slipping having also occurred in his practice.

A curious circumstance in relation to Abernethy's case is that he used the thermometer, locally, in the treatment of the case. He

ascertained by a Fahrenheit thermometer the degree of heat in the limb in which the external iliac artery had been tied, and compared it with the heat of the healthy limb, and found on the second day the unaffected limb four degrees lower in temperature than the limb which had been operated upon. On the fourth day the two limbs were of the same temperature. This was a very successful case, and a good recovery being the result, it ranked as an event in the surgery of the time.

In another example, in which a German sugar-baker was the subject, Abernethy performed a similar operation; but death followed, owing, apparently, to escape of blood and putrefaction of it in the femoral artery. The untoward result led him to suggest that in another case, if signs of putrefaction of the blood should ensue, he would make a small opening into the aneurismal bag for the removal of any contained blood; and this being done, if no blood came from the lower orifice of the artery there would be no necessity for tying it near the sac.

A New Gorget.

In operating Abernethy appears to have been extremely skilful and collected. From the commencement of his lectures on the operations of surgery he was, he says, accustomed to tell the students that surgeons seemed to him too fond of inventing and using new instruments; that the way to appreciate the perfection of an instrument was to inquire what was wished to be accomplished by it, and if this was effected it was absurd to change one method for another. This very sound advice was addressed to Dr. Batty, in May 1803, *à propos* of a gorget he (Abernethy) had invented, as an improvement on Hawkins' gorget, in which the cutting edge had, in every part, the same direction, turned up at an angle of 45° . The instrument exactly accomplished, its inventor urged, what it was designed to execute.

Mercurial Fumigation in Syphilis.

An essay entitled *Diseases Resembling Syphilis* introduced a powerful argument to the effect that there are very often cases of disease resembling syphilis in which there is really no specific infection—pseudo-syphilitic disease. He gave several instances in point, one particularly in which a certain woman communicated this pseudo condition three times to the same man. In the treatment of

true syphilis he tells us he was very distinctly in favour of mercurial fumigation, and informs us that the method was introduced in the year 1776 by the Chevalier Lalouette, a physician of Paris. He found this method, he says, in the majority of instances a more powerful and innocent means of producing the mercurial affection of the constitution than inunction, or the external use of mercury, and equally certain of radically curing the disease for which it was administered. The fumigating powder he used was calomel washed in water containing a small quantity of ammonia, so that the powder may be deprived of its muriatic acid and assume a darker grey colour. No improvement on this method has been advanced up to the present day, and I think we are now, pretty well all of us, of opinion that if mercury is to be administered at all in specific disease it is best administered by fumigation. That, at any rate, is my experience, and I never think of using any other method.

Injuries of the Head.

I look upon an essay by Abernethy on *Injuries of the Head* as replete with practical wisdom. He maintained that the older surgeons certainly trephined unnecessarily in consequence of their belief that the brain was an organ of so delicate a structure that the least degree of pressure would be highly injurious; whilst others, from having witnessed the frequent ill-success of the operation, and from having observed that many patients recovered unexpectedly when it was omitted, seemed inclined too generally to reprobate the practice. Under these circumstances it appeared proper to show what kind of cases would probably do well without having recourse to it, and he gives a series of most remarkable illustrations with the argument that it is often very useful to postpone the operation until after the subsidence of any inflammatory symptoms, even though the structure of the brain be injured by the accident. The whole of the essay, including one hundred and thirty-two pages, would well bear republication.

Ill-Consequences Following Venesection.

Abernethy had an unhesitating belief in venesection as a remedy, and the extent to which he bled would, I think, have brought him up for malpractice now. At the same time he was careful in pointing out the ill-consequences which sometimes succeed to venesection,

and which he had seen. He placed the dangers under the following heads:—

- (1) Inflammation of the integuments and subjacent cellular substances.
- (2) Inflammation of the absorbing vessels.
- (3) Inflammation of the vein.
- (4) Inflammation of the fascia of the forearm.
- (5) Ill-consequences succeeding to a wounded nerve.

Classification of Tumours.

Abernethy's classification of tumours has been considered ever since its appearance, as the sound foundation of this subject. He tells us that in attempting a classification of tumours he supposes that they may be made to constitute an order in the class of diseases in nosology, and the meaning of the word may be restricted to substances of new formation which made no part in the original structure of the body. The order may then be divided into genera, and the first may be denominated, from having a firm, fleshy feeling, Sarcoma, or Sarcomatous Tumours.

The order of sarcomatous tumours contains many species, the *first* of which he treats as being apparently composed of the coagulable part of the blood, rendered generally vascular by the growth of vessels through it without having any noticeable peculiarity in their distribution. These tumours may be called *common vascular*, or *organised sarcoma*. A *second* species, found frequently in the fore or back part of the trunk of the body, are enclosed always in a thin capsule of common cellular substance, and are called by him *adipose sarcoma*. Although they are made up of adipose, or fatty substances, with some but not numerous vessels, he conceives that in the first instance they are formed of coagulable lymph rendered vascular by the growth of vessels into it. He narrates that he has seen an abscess form in the substance of an adipose tumour with earthy matter deposited on the sides of the cavity. He had also seen osseous matter deposited within the substance of an adipose tumour. The *third* species of this genus he designates as *pancreatic sarcoma*, as the tumour resembles the pancreas in appearance. He considers that it occurs most frequently in the female breast, perhaps originating in the lymphatic glands. The *fourth* species he calls *cystic sarcoma*, a tumour more frequently met with in the testes and ovary. The mass consists of a congeries of cells containing a serous fluid, the sides of the cyst so vascular as to be made red by injection. In this kind of cyst is found sometimes a caseous substance which resembles cheese in consistency. A *fifth* species he denominated *mammary*

sarcoma, because it so closely resembles the mammary gland in colour and texture. The *sixth* species he named *tuberculated* sarcoma; it consists of an aggregation of small, firm, roundish tumours of different sizes and colours connected together by a kind of cellular substance; the size of the tubercles is from that of a pea to that of a horse-bean; the colour of a brownish red, and some of a yellowish tint. The *seventh* he defines as *pulpy*, or sarcoma generally found in the testes, and before his time usually distinguished by the name of soft cancer; but the term cancer is objectionable because it conveys an erroneous idea of its nature. The *eighth* species of sarcomatous tumour he defines as the *carcinomatous* tumour. This on account of its peculiar hardness, is emphatically called *schirrus*, while it remains entire and free from ulceration.

He observed, after Mr. Hunter, that a disposition to cancer exists in the surrounding parts prior to the actual occurrence of the diseased action, a fact which led to the rule in practice that a surgeon ought not to be contented with removing actually the diseased part. He held that cancer, like most other local diseases, owes its origin to a disordered state of the health in general; that is to say, there is a predisposition to cancer. He thought also, with Mr. Hunter, that cancer is so far local that if all the diseased part, or that which is so contiguous to it as to have felt its influence, were removed, the patient would be as exempt from cancer in that part as if it had never occurred; but he opined that, though this be true, the state of constitution which induces the disease originally may, after a certain lapse of time, cause the disease to recur. He differentiated other tumours by their regularity of surface and shape and a pulpy feeling, cysts most frequently composed of many lamellæ. They sometimes adhere most tenaciously to the contiguous parts, and the interior surface secretes the contents found in the cysts. Some notions have been entertained that these cysts may be of the nature of hydatids. They are commonly called *wens*, and their contents have been denominated steatomatous, atheromatous, and emiliceritous, but occasionally they secrete a substance like nail or horn.

Another genus of tumours to which he referred were the *osseous* tumours, and he maintained that vascular tumours may become converted into a substance resembling cartilage.

The Theory of Life.

Mr. Abernethy was a great admirer of Hunter, and may indeed be considered as one of his most ardent, as well as immediate, followers.

Like Hunter, he was often contradictory in the statements which he put forward, and in the use he made of the word "life"; but, setting aside a certain measure of obscurity which those who read carefully will find in the works of Hunter himself, he was considerably in advance of his time, and perhaps of our time, on the question of living motion and the influence of the subtle principle to which he gives the name of "life." Abernethy taught that in surveying the great chain of living beings life is found connected with a vast variety of organisation, yet exercising the same functions in each circumstance, from which we may naturally conclude that life does not depend on organisation. It seems to me as if he looked upon life as something essentially independent, as pervading the surface of the planet, and as exercising in itself and by its presence certain distinctive powers. He quotes Hunter to explain that in speaking of the properties of life we speak of something that prevents the chemical decomposition to which most animal matter is so prone; of something which regulates the temperature of the bodies it inhabits, and of something that is the cause of the actions we observe in living bodies. All these circumstances, though deduced from an extensive contemplation of the subject, may be legitimately drawn from observations made on the egg. A living egg does not putrefy under circumstances that would rapidly cause putrefaction in a dead one. The living egg resists a degree of cold that would freeze the dead one, and when the fresh egg is subjected to the genial warmth of incubation the matter of it begins "to move," or "to be moved"—the difference of the verb from the active to the passive voice is worthy of remark—so as to build up the curious structure of the young animal.

Touching on the way this subject had been discussed by various authors, Abernethy was rather severe. "Many persons," he says, "have genius without industry; others have industry without genius; while many who have both are still deficient in judgment." Hunter, he seemed to think, had both industry, genius, and judgment, so that his thoughts have "probability, rationality, and theory," especially when the subject of irritability is discussed. On the subject of muscular motion he taught that muscular contraction is primarily due to the effect of chemical change occurring in a part; secondly, that contraction of irritability is a property of muscular fibre; thirdly, still on Hunterian projection, that irritability is the effect of some subtle, mobile, invisible substance, superadded to the evident structure of muscles, or other forms of animal and vegetable matter; as

magnetism is to iron, and as electricity is to various substances with which it is connected. In magnetic and electric motions a subtle invisible substance of a very quickly and powerfully mobile nature puts in motion other bodies which are evident to the senses, and are of a nature grosser and more inert.

On the theory of irritability he is as convinced as we now are that electricity pervades all nature. Life, in short, "inheres" in vegetables and animals, and as the motions of electricity are characterised by their celerity and force, so are the motions of irritability. The motions of electricity are vibratory; so likewise are those of irritability. When by long continued exertion the power of muscles is fatigued, or when it is feeble, the vibratory or tremulous motions of muscle are manifest to common observation, but the same kind of motion may be perceived at all times by attention.

In a really elegant and enthusiastic passage he endeavoured to point out, on Hunterian doctrine, how matter, starting from the general mass, springs into life in vegetation. He showed how electricity is sufficient to produce great physical changes in inert matter without the intervention of human assistance, and he therefore infers that when we perceive in the universe at large the cause of rapid and powerful motions of masses of inert matter we may naturally conclude that the inert molecules of vegetable and animal matter may be made to move in a similar manner by a similar cause. At the same time he was careful to guard himself against declaring that change from dead animal and vegetable matter to living is proved as being induced by electricity. He inclined rather to an *anima mundi* as the unknown widely spread factor.

Turning to a kindred subject, Abernethy believed that all sensation is in the brain, and that all volition proceeds from the brain. He argued, first, that if the continuity of a nerve be intercepted at any point between that extremity which receives impressions from the objects of sense and which may therefore be called the impressible or tangible extremity, and that which communicates with the brain and is usually called its sensorial extremity, both feeling and volition by means of that nerve are suspended. Secondly, he was of opinion that if a certain degree of pressure be made upon the brain, both feeling and voluntary motion cease whilst the pressure continues, and return when it is removed. Thirdly, as we have evidence that the perceptions and intellects of animals increase in proportion as the brain becomes larger and more complex, so we have reason to conclude that these faculties are connected with the brain.

Fourthly, the conviction which we generally, though not constantly, experience, that feeling exists in the part which receives impression, is a deceptive conviction, as proved by the following "facts." If a nerve be irritated between the brain and its extremities, severe pain is supposed to be felt in those extremities; and if it supplies muscles, those muscles become convulsed, a fact which proves that motions excited in the middle of the nerves are transmitted to the brain, and from thence to the parts where the effects are determinable. Fifthly, Mr. Abernethy urged that motion does not necessarily imply sensation, because motion takes place where no one yet imagined that sensation could take place, a point he tried to illustrate by comparing the act of crystallisation, which begins from a point touched, and rapidly and regularly pervades the liquor of a saturated solution, till the whole assumes a solid form. Here he became obscure, desiring, as it seems to me, to show that extensive inflammation of surface partakes of the same physical character as crystallisation. Candidly, I cannot follow him, but the fault may be mine, or it may be a want of perspicuity of expression on his part, for he was not a good writer. He preferred too frequently to use pronouns instead of repeating nouns, a fearful literary error.

Local and Constitutional Disease.

The volumes which brought Mr. Abernethy into greatest repute were those on the constitutional origin of local diseases. These works were very much appreciated by the public, and deservedly so, but amongst some members of the profession they created a feeling of criticism and dislike. It is impossible, says one of his admirers, not to admit that there is sometimes a degree of crudity in his performances which is neither consistent with his large advantages nor the length of time he has appeared as an author. A leading chapter in his work bears on the disorders of the system in general, and of the digestive system in particular, which accompany local disease, whether they be sympathetic or idiopathic. He insisted that the effects of local disorders on the constitution had been too little attended to, and urged that the reciprocal operation of constitutional disorders upon local diseases had obtained still less attention. He thereupon followed up with illustrations showing from cases he had observed to what extent these two considerations deserve more study from the learned. He dwelt very much on errors of digestion as leading to local affections, and defined, often excellently well, the

difference between what he called disorder and disease; disorder being the derangement which leads to disease. He wrote at great length on the digestive process, and was extremely insistent on the relation of disorders of the digestive function in connection with various nervous and muscular diseases. There can be no doubt that he occasionally met with cases of supposed incurable local diseases like paralysis, which did depend on mere derangement of the alimentary canal, and as I study this part of his work I have learned many useful hints and principles from it bearing on this point. I find, for example, the following passage, which is very good, and worthy of remembrance in this day:—

“The reciprocal sympathy which exists between the brain and the digestive organs is generally admitted, but the kind, and the degree of the effects arising from this sympathy is not, perhaps, in general, sufficiently understood. These organs mutually increase each other's disorder till the affection of the sensorium leads to the greatest disturbances of the nervous functions, and even those of the mind.”

He considered that apoplexy may occur from stomachic disorder, and that the perfect recovery of patients which sometimes happens after stomachic disorders may also be considered as additional evidence of there having been in such instances no organic disease of the brain. He held the same view in regard to certain cases of epilepsy, and he added:—

“Now, if disorder of the digestive organs is capable of causing or aggravating nervous disorder, even to the production of those effects which have been mentioned, when there is no alteration of structure, it will be granted that such a state of irritation of the sensorium may lay the foundation of an excitement of the vascular structure of the brain, and thus very frequently produce organic disease. When this has occurred it will aggravate and establish the nervous affection, and thus perhaps render it insusceptible of cure.”

There is so much of sound common sense in many of Abernethy's remarks on the constitutional origin of local disease that I cannot avoid recalling some of them.

False Divisions of the Healing Art.

“An evil seems to have arisen from the artificial division of the healing art into the medical and surgical departments. This division has caused the attention of the physician and the surgeon to be too exclusively directed to those diseases which custom has arbitrarily

allotted to their care. The effects of local disorders upon the constitution have, in consequence, been too little attended to; and, indeed, there is no book to which a surgical student can be referred for a satisfactory account of those febrile and nervous affections which local disease produces, except that of Mr. Hunter. The reciprocal operation of constitutional disorders upon local diseases has obtained still less attention. To investigate more particularly some parts of these subjects, and to submit them to public notice, are the proposed objects of the present paper"—a paper on the constitutional origin of local disease.

Universal Sympathy.

"No part of the animal body can in general be very considerably disordered without occasioning a corresponding derangement in other parts of the system. Such disorder has been considered by Mr. Hunter as the result of universal sympathy. This consent of the whole constitution with its parts manifests itself, in particular instances, by a greater disturbance of the functions of some organs than of others; and from this circumstance diseases have derived the appellations by which they are commonly distinguished. If the actions of the sanguiferous system be principally disturbed, and the temperature of the body subject to unusual variations, the disease is termed fever; if the nervous system be chiefly affected, a state of vigilance or of delirium may be produced; while convulsions and tetanus take place when the functions of the muscular system are more particularly deranged. Though the disorder of particular organs thus gives a character and denomination to the disease, it is sufficiently evident, in instances adduced, that the whole constitution is disturbed; while certain parts are chiefly affected, perhaps from unknown circumstances relative to the nervous system, or from a predisposition to disorder existing in the affected parts. It seems to be ascertained that persons of particular constitutions are predisposed to those febrile actions of the sanguiferous system which constitute the inflammatory fever; that there is a propensity to convulsions in children, and to tetanus in the inhabitants of warm climates."

Digestive Failures.

"In a perfectly healthy state of the digestive organs," he continues, "probably no chemical decomposition, even of the fæces, takes place; yet such changes happen, in some degree, without apparently

producing any injurious consequences. To chemical changes we may probably attribute the extrication of inflammable air, and the various and unnatural odours of the fæcal matter, which are observable in disordered states of the digestive viscera."

In continuation of the same argument he explains:—

"It is a principal object of medicine to give strength and tranquillity to the system at large, which must have a beneficial influence on all its parts, and greatly promote the well-being of every local disease. We cannot reasonably expect tranquillity of the nervous system whilst there is disorder of the digestive organs. As we can perceive no permanent source of strength but from the digestion of our food, it becomes important on this account that we should attend to its quantity, quality, and the periods of taking it, with a view to ensure its perfect digestion."

Foods and Feeding.—Quantity.

"First, with respect to quantity: there can be no advantage in putting more food into the stomach than it is competent to digest, for the surplus can never afford nourishment to the body; on the contrary, it will be productive of evils. Being in a warm and moist place, the undigested food will undergo those chemical changes natural to dead vegetable and animal matter: the vegetable food will ferment and become acid, the animal will grow rancid and putrid; this is only rendered evident occasionally when a disordered stomach rejects some of its contents; then the teeth are roughened and set on edge by the corrosive qualities of the acid, and the throat feels burnt by the acrimony of the rancid oil. These effects, though occasionally made apparent, must constantly take place, unless by the digestive powers of the stomach the food is converted into a new substance which is not liable to these chemical changes. Such new and irritating compounds may not, indeed, materially injure a healthy stomach, but cannot fail to be detrimental to one that is weak and irritable, as well as to the tract of the alimentary canal, and thus maintain and aggravate its disorder. Part of the food thus changed will be imbibed from the bowels and render the blood impure, from which there is no outlet for various kinds of matter but through the kidneys, and this may prove a cause of foul urine, as well as of the presence of many substances in that fluid not natural to it, and be productive of serious diseases in the urinary organs. Observing the evils resulting from undigested aliment, we surely ought to guard

against them by proportioning the quantity of our food to the digestive powers. Nature seems to have formed animals to live and enjoy health upon a scanty and precarious supply of food ; but man in civilised society, having food always at command, and finding gratification from its taste, and a temporary hilarity and energy result from the excitement of his stomach, which he can at pleasure produce, eats and drinks an enormous deal more than is necessary for his wants or welfare ; he fills his stomach and bowels with food which actually putrefies in those organs ; he fills also his blood-vessels till he oppresses them, and induces diseases in them as well as in his heart. If his digestion be imperfect he fills them with unassimilated substances from which nutriment cannot be drawn, and which must be injurious. In proportion as the powers of the stomach are weak, so ought we to diminish the quantity of our food, and take care that it should be as nutritive and easy of digestion as possible. By adopting an abstinent plan of diet even to a degree that produces a sensation of want in the system, we do that which is most likely to create appetite and increase the powers of digestion. In how great a degree want effects these objects, is evident in those who have been obliged to fast from necessity, or have been much reduced by hæmorrhage."

Quality of Foods.

"Secondly, as to quality. When the stomach is weak, it seems particularly necessary that food should be nutritive and easy of digestion. Its qualities should be adapted to the feelings of the stomach. In proof of this proposition numerous instances might be mentioned of apparently unfit substances agreeing with the stomach, being digested, and even quieting an irritable state of stomach merely because they were suitable to its feelings. Instances might also be mentioned of changes in diet producing a tranquil and healthy state of the stomach in cases where medicines have been tried in vain. Neither can such occurrences excite surprise, for as digestion and the consequent tranquillity of the stomach depends on a proper quantity of healthy juices being secreted and commixed with the food, such secretions are likely to be produced by whatever agreeably excites it, and obstructed by whatever has a contrary tendency."

Times for Food.

"Thirdly, as to the times of taking food. It is evidently the intention of nature that we should put into the stomach a certain

portion of food, the excitement of which, inducing a secretion of gastric fluid by its action, becomes digested. This office of the stomach being effected, it should be left in a state of repose till its powers are restored and accumulated, and this return of energy would in health be denoted by a return of appetite. It is probable that three hours may elapse in health before digestion of a moderate meal is effected, so that the stomach is empty and in a state of repose. It is therefore reasonable to allot the same portion of time for the same purpose when the organ is disordered, whilst we have diminished the quantity of our food in order to proportion it to the diminished powers of the organ; yet instead of pursuing this rational plan of diet, many persons are taking food every third or fourth hour, pleading in excuse for such conduct that they cannot do without it. The truth is, that when the stomach is disordered the exertion of digesting a single meal after its excitement and efforts have ceased, is productive of languor, sinking, and inquietude, which ought to be calmed or counteracted by medicines and not by food, for a second meal cannot be digested in this state of the stomach. We also often tease and disorder our stomachs by fasting for too long a period; and when we have thus brought on what may be called a discontented state of the organ, unfitting it for its office, we sit to a meal, and fill it to its utmost, regardless of its powers or its feelings. The rules, then, for diet may be thus summarily expressed: we should proportion the quantity of food to the powers of the stomach, adapt its quality to the feelings of the organ, and take it at regular intervals of six or seven hours thrice during the day."

Water the one Natural Drink.

"Everything which we take into the stomach, except food, may be considered in two points of view—either as a diluent or a medicine. Water is the only diluent, and we are in the habit of mixing alimentary matter and stimulants with it. Diluents probably ought not to be taken during or immediately after our meals, since they would be likely to render the juices of the stomach less efficacious in the digestion of our food. Hunger and thirst seem to be incompatible sensations: a hungry animal would eat to satiety, and the stimulus of the food would bring on a discharge of the juices of the stomach which have the power of digesting the food; and it is not probable that the sensation of thirst would be experienced till this operation of the stomach is effected. If the sensation of thirst

then occurred, water would appease it, without frustrating the digestive functions; and, being absorbed from the alimentary canal, a certain portion of it would be furnished to the blood, and the surplus would pass off from the skin, lungs, and kidneys. All stimulants must be regarded as medicines; vinous liquors are of this class, and, being suitable to the feelings of the stomach, are in many cases very efficacious, yet they are liable quickly to pass into a state of acetous fermentation, and to provoke that change in the remaining quantity of the vegetable matter contained in a disordered stomach, and thus produce a strong and injurious acid. The rule for taking vinous liquors in persons to whom habit has rendered them necessary, may be thus briefly stated. They should not take them during their meals, lest the temporary excitement they produce should induce them to take more food than the powers of the stomach are capable of digesting; but, afterwards they may be allowed so much of them as may be required to induce agreeable feelings, or, to express the fact more clearly, as is necessary to prevent those uncomfortable sensations which the want of them may occasion; and it may be added, the less they take the better. People deceive themselves on this point. A disordered stomach will feel uncomfortable after eating; fermented liquors will remove for a time the unpleasant sensations. Potion after potion is swallowed on this account; often without producing permanent tranquillity, and much to the injury of the stomach. Wine drinkers do not drink wine after every meal, which proves that wine is not necessary to their digestion; and many who have confided in this belief have been convinced of their error by leaving it off and finding that they digested their food as well when deprived of it, and that such privation greatly contributed to their eventual restoration to health. When stimulants seem requisite and fermented liquors run into the acetous fermentation in the stomach, spicy and aromatic vegetables should be substituted, such as ginger, pepper, and mustard."

Miscellaneous Essays.

There are several other essays by Abernethy which in their time very much influenced the medical and surgical world. An essay on perforating the distended bladder above the pubis in cases of distention was one of these. A modification of his plan of perforating lumbar abscess in several places is another. An interesting account of the effect of opening the chest wall in some cases of emphysema may be read still with profit; his hypothesis of the uses of the

Foramina Thebesii of the heart, discovered by Thebesius and bearing his name, is ingenious ; his description of a contraction in the opening between the right auricle and right ventricle of the heart, and of other instances of that function of the body, are worthy of record, as is his account of a fungus of the antrum which, evolving upon the cheek, sloughed away during a fever, and did not return, but was followed by exostosis. Natural history is indebted to him for particulars on the anatomy of the whale, especially in reference to the arrangement of the lacteals in that mammal. And, that he did not despise general literature is shown by the fact that he wrote articles for Rees' *Cyclopædia* and other general works ; but it cannot be said that he shone as a writer.

A rather singular controversial point sprang up between Abernethy and an able cotemporary of his, Dr. Lamb. Many years ago a descendant of Dr. Lamb, daughter or granddaughter, did me the honour to submit to me the works of Dr. Lamb, under the idea that he was being too speedily forgotten. I agreed with her, for after perusing his work I could not fail to discern that Lamb was a man of rich attainments and of original mind. He was practically the founder of the new vegetarian system of diet, and, I may almost say, he was the first to indicate that some acute diseases, such as cholera and diarrhœa, spring from the drinking of bad water.

Among other ideas of this enthusiastic man, Dr. Lamb, was one to the effect that cancer is preventible and even curable by the plan of drinking distilled water. He brought a case before Abernethy treated on the method, and seemed afterwards to imply that Abernethy took credit to himself for the idea. Abernethy does not appear to have repudiated fully the charge, and so the matter rests.

PERSONAL CHARACTERISTICS OF ABERNETHY.

I have shown already how strangely Abernethy has influenced the popular mind. It was not only as a surgeon, but as a man, and as a physician that it was true. He is one who has flourished on in his oddities, some say on his vulgarities. There is a difference of opinion on this point. Sir Richard Owen told me that the statements concerning him were often grossly exaggerated, and Dr. Robert Willis, who knew him intimately, expressed to me that I must take everything said against him *cum grano salis* ; that a more kindly disposed man did not exist ; and, that, without him the magnificent library of the Royal College of Surgeons would never have been

established. On the other hand, Pettigrew, who also knew him and admired him much, gives him a sad character for rudeness and uncouth demeanour. Pettigrew tells a number of anecdotes bearing on this subject ; to wit :—

A man of rank consulted Mr. Abernethy, and was received by him with remarkable rudeness. Upon some severe remark being made, the patient lost his temper, and told Mr. Abernethy he would make him eat his words. "It will be of no use," said Mr. Abernethy coolly, "for they will be sure to come up again."

"Pray, Mr. Abernethy, what is a cure for gout?" was the question of an indolent and luxurious citizen. "Live upon sixpence a day—and earn it," was the reply.

He is reported as being consulted by the Duke of York of his day ; he stood before his Royal Highness, whistling, with his hands in his breeches pockets as usual. The Duke, astonished at this conduct, said, "I suppose you know who I am?" "Suppose I do," said he ; "what of that?" And his advice to his Royal Highness was given thus : "Cut off the *supplies*, as the Duke of Wellington did in his campaigns, and the enemy will leave the citadel."

A barrister had a small ulcer on the leg which was difficult to heal, and he determined to apply to Mr. Abernethy. Aware of his impatience and eccentricity, he, immediately upon entering the room, began to pull down his stocking. "Holloa ! holloa ! what the devil are you at?" said the surgeon. "I don't want to see your leg ; that will do—put it up, put it up." The patient did so ; but, justly dissatisfied with the imperfect manner in which his case had been considered, instead of the usual fee, placed a shilling only upon the table. "What is this?" said Mr. Abernethy. "Oh," replied the barrister, "that will do—put it up, put it up," and coolly walked away.

"The Count was wounded in the arm ; the bullet had sunk deep into the flesh ; it was, however, extracted, and he is now in a fair way to recovery.' That will do very well for a novel, but it won't do for us, gentlemen,"—Abernethy's pupils.

"Sir Ralph Abercrombie received a ball in the thick part of his thigh, and it buried itself deep, deep ; and it got among important parts, and it couldn't be felt ; but the surgeons, nothing daunted, groped and groped, and groped,—and Sir Ralph died"—to the same.*

* I am indebted to an old friend, Miss Walker, of Whittington, for a glance at an album, once belonging to a deceased relative, of the date of Abernethy's death,

It is not necessary to dwell longer on the peculiarities of John Abernethy ; of his habit of thinking aloud ; of speaking to his students, who adored him, in irrelevant, interjectory manner ; of his petulancy, his impulse, and his wish in all he did to rule. He had many faults : on that point there can be no mistake ; but he had also many virtues.

in which is inserted the MS. of a droll poem, dealing—as was common at the time—with many of his eccentricities of speech. One dyspeptic patient is advised :—

“ ‘Not to eat either tongs, poker, or bellows ;
Poker and tongs too hard you'll find,
Bellows would fill you up with wind.'
‘May I eat oysters, sir?’ ‘Yes ! Well !’
‘And what besides?’ ‘Why, eat the shell.’”

To another patient :—

“Said Abernethy, ‘Buy my book,
At pages four and seven look.’”

A third, who objected to a shower bath, was recommended :—

“To take an umbrella first.”

The next time :—

“ ‘You'll only need a parasol.’ ”

To a lady who complained that she was :—

“ ‘All over pains inside and out’ :
‘Yes, like a window, ma'am, no doubt.’ ”

A lady who had pains in the arm was told :—

“ ‘Pooh ! nonsense ! if it hurts your arm,
The more fool you to raise it, ma'am.’ ”

An old farmer from the fens, who narrated his daily diet, was dismissed with the criticism :—

“ ‘What, nothing more ? six meals at least ;
Six meals a day ! a perfect beast !’ ”

A son of Mars was introduced and advised to :—

“ ‘Roll from the window to the door
And back again upon the floor.'
‘And what besides, sir?’ ‘Nothing more ;
Good-morning ! please to shut the door.’ ”

A patient, rather annoyed by his abruptness, was equally abrupt in avoiding to pay the fee. But a lady who visited him, knowing his peculiarities, saying nothing to him, presented her thumb for his inspection. “Cut ?” “No, bite.” “Dog ?” “No, parrot.” “Shut it up and return next Wednesday.” She returned in silence. “Better ?” “No, worse.” “Put on a poultice and come again.” A final visit followed, once more in silence. “Worse ?” “No, well.” Then the moral :—

“ ‘No pain then?’ ‘No, not e'en a tingle.’
‘Sensible woman ; would that I were single !’ ”

He was frank, open, decisive, observant. His jokes even extended to himself, as when he said of his own œdematous limbs, "Why, I am better on my legs than ever; you see how much stouter they are."

We turn to his portrait and we see the individual, a fine face with a steady cynicism of expression and sly laugh—a comic face, in fact, with humour in it not concealed. There are several good portraits of him, besides that which I have given with this biography (that probably either by Dance or Daniel), including one by Sir Thomas Lawrence in St. Bartholomew's Hospital; Mr. Le Cheminant, of Wigmore Street, possesses also an excellent miniature, which strikingly supplies the humorous expression.

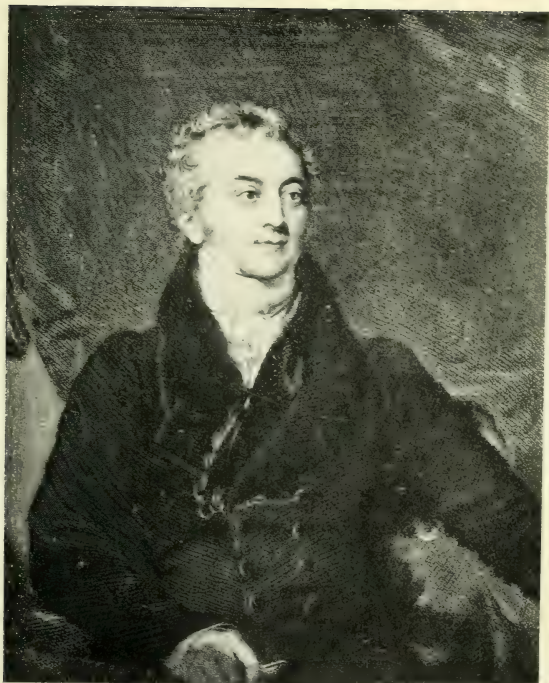
Mr. Abernethy did not rank with long-lived men. Before his sixty-sixth year he had not only retired from the hospital, but had altogether given up practice and had withdrawn to Enfield, at that time a very famous place of resort. There he suffered a prolonged illness, in which, probably, the heart was most affected, together with the kidneys. He became dropsical, and passed away on April 20th, 1831.

In the medical firmament Abernethy was not a star of the first magnitude, and his peculiarities, upon which he seems to have prided himself, did not tend to his lasting fame. His students, nevertheless, looked on him with the utmost pride, as well they might, for he was an industrious, earnest, and friendly teacher. For them he founded, at St. Bartholomew's, the Medical and Philosophical Society, which, immediately after his death, was changed to that "Abernethian Society," the centenary of which, as stated at the opening of this paper, was celebrated with a display of enthusiasm Hippocrates himself might have envied, could he have forecast his fate in the future history of his art.

Thomas Young, M.D., F.R.S.

IN the last biography, readers of it were introduced to a once well-known surgeon in London, named Abernethy. I said of him that he was not one of the great ones of physic, but that he was a remarkable man of his time, with some ingenuity and many strange oddities, which told upon the public mind. Referring to a celebration held in his honour during the present year (1895), and which had reference to this centenary, I mentioned that amongst the portraits of other celebrities of the day there was one of Dr. Thomas Young; but that it was little regarded, because Young himself had gone out of remembrance except to a few individuals. It was the fact that Abernethy was the brilliant star of the moment. Young was as a comet that had appeared for a short time, and had never returned. This is not infrequently the fate of man in this world; but I should be sorry if I lent myself to the same idea. To my mind Abernethy was a small comet of a strange shape, and of little brightness, while Young was a fixed star of our science firmament; the next man of science even to Newton himself; a man whose name can never be forgotten while there is a science; a worker who contributed to the scientific life of this nation; one who did as much as any other man who has preceded him, and who certainly has never been superseded up to this period, either in England or the world. It may be well, therefore, for us to take a glance at so great and striking an individuality.

Thomas Young became a London man, in some sense a Bartholomew's man, and, perhaps, a pupil of Abernethy's. It is a curious fact in regard to him, that during his time there were two men of the same name, and one of precisely the same name, "Thomas Young," with whom he has been confounded. Of the last-named Thomas of his name, little need be said, because he is very slightly in the way; but the other man, whose name was



Thomas Young

From an engraving by J. Thomson, after a painting by Sir Thomas Lawrence, P.R.A.

Samuel Young, was worthy of greater observation. Samuel Young was indeed the possessor of very considerable parts. He was a surgeon who did not scorn to be, in some measure, a general practitioner; and he practised, I should conceive, on a large scale. He seems also to have written pretty considerably; but what he wrote had relation purely to the practical details of his profession; and certainly his essays on medicine still deserve consideration. But he was, after all, simply a practitioner; and he bears no kind of comparison to the great Thomas Young, of whom we are now speaking, and for whom he was sometimes mistaken. Our Young should be confounded with none other; his theory of 1802, on light in colours, rendered as a Bakerian Lecture, and the "law of interference," which he established, were so wonderful that M. Arago looked upon them, not only "as his chief discovery, but something that renders him immortal," alone sufficient for his lasting fame, if he had done nothing more and nothing less.

By birth Young was a member of the sect called Quakers. His father was a Quaker; his mother was a Quakeress; and although he himself seems to have turned, in his later days, into a Church of England man, and accepted one of its sacraments, he may be said ever to have remained a Quaker in his disposition. There is little doubt that in his earliest days he was taught the true Quaker language, the *thee* and the *thou*, as well as the faith; and we find that he did not entirely forget the language, for though to other people he conversed in the ordinary way, in his letters to his mother he would assume the old method without any wandering strain. We must look upon him in this light, the Quaker blood still in his veins, and must thereby understand that when he *did* a thing, he *did* it, and that there was no compromise in his nature. He spoke what he believed to be true, and held by the truth; for though he was never what might be called a strong man physically, and died early, he had an active mind which knew no demurs.

Young was born on June 13th, 1773, at Milverton, a small town in Somerset, from twelve to thirteen miles from Bridgewater. The town stands in a beautiful valley, and is of great antiquity. There was connected with it, and I believe still is, a small market; and the place remains to this day a notoriety, not only because he, Young, was born in it, but because a friar by the name of John of Milverton brought out, in his time, an attack or essay against the eminent reformer Wickliffe. Young was the firstborn child of a family of ten children, his mother being a niece of a medical man in London

of that day who was of great fame, and whose name was Brocklesby, a name which every one in those days knew, and which Samuel Johnson was very proud to recognise. It is recorded of Young that, from the first, he had a powerful memory, and that he learned the languages of English and Latin so well, that he could recite them before he could understand what they meant, an advantage in a sense, and yet not altogether advantageous. While he was a child he went to school at the neighbouring town of Bristol; but he was not particularly advanced in his studies by his teaching, for it was felt that the teacher was not well adapted to deal with him. It is not very clear how many years he remained ill taught; but it seems that, during a vacation, a land-surveyor of his own district took a fancy to him, gave or lent him instruments with which to test his skill, supplied him with a dictionary of arts and sciences, probably Chambers', which was the great dictionary of that day, and helped him very much in his early career. From his first school he went to an academy kept at Compton, in Dorsetshire, the master of which was a Mr. Thompson, to whom he seems to have been very deeply indebted, and from whom he learned to become competent in the study of the Hebrew Bible in its original form. The Eastern languages were made familiar to him in these beginnings. From Mr. Thompson, Young secured also a good education in the first books of mathematics, and in French and Italian; and whilst following these preliminary studies he began to construct instruments on his own account, making a microscope for himself from Martin's description. In this way he became acquainted with elementary optical phenomena. The story concerning him goes on to explain, that while under Thompson he also learned from Martin's work something about the doctrine of fluxions, yet languages filled his mind.

It is said that when he was fourteen he left the tuition of Mr. Thompson, fairly acquainted with Greek, Latin, French, Italian, Hebrew, Persian, and Arabic; and it will be understood that from these acquirements his friends formed a very high opinion of his knowledge, judgment, and taste. It was a question to what profession he should attach himself, and some hesitation seems to have taken place, one thinking he was destined for the Church, another for the law, while he, tinctured perhaps by his mother's relationship to Dr. Brocklesby, was inclined to make physic the study of his life. Before he was quite decided he became acquainted with Mr. David Barclay, of Youngsbury, in Hertfordshire, the grandfather of Hudson Gurney, to whom, ultimately, he—Young—acted as tutor in Mr.

Barclay's house. Here, his health somewhat gave way, and it required all the attention of Dr. Brocklesby and of Baron Dimsdale—the predecessor of the present Sir William of that name—for him to hold his own. He did so, however, and very largely assisted one of his sisters in her studies. At Youngsbury he took up very closely the study of Astronomy, from which he received, as he says, much pleasure, a pleasure he wished to communicate a share of to others. He became acquainted with the great philosophers and poets of antiquity, kept ample notes of his daily studies, and acquired great facility in writing Latin; composed Greek verses of good quality; dipped into the higher Mathematics; and likewise made a study of Botany, Geology, and Entomology—all in those days advanced and laboured acquirements.

As we read these details we are somewhat surprised at the amount of information which students could gather in the latter part of the last century. In the present day we feel a just cause of complaint at the immense amount of learning that is demanded from our scholars when they are contending for their earlier degrees at the universities. But, in fact, there are few of them who have had so wide a mastery of many subjects as that which youthful scholars, like Thomas Young, possessed. The only difference is that the type of the school he belonged to sought the learning voluntarily, whilst our scholars have it forced upon them and grind for it, a mighty difference in the long run.

During the time that Young remained as tutor to Hudson Gurney in Mr. Barclay's residence in Hertfordshire, he spent a considerable amount of time during the winter season in the Metropolis, where he rendered himself conversant especially with the Egyptian language, becoming very well acquainted with its rudiments, which he included later on in a dictionary on the subject. During the time he resided in London he also became intimate with Dr. Brocklesby, his uncle, and at Brocklesby's solicitation, or in imitation of him, he made his first entrance into the profession of medicine; he likewise made, during this time, the acquaintance of many men very prominent in the worlds of letters and science, by whom his general knowledge of the world at large was considerably increased, for Dr. Brocklesby seems to have been a man who gathered about him all kinds of distinguished friends and gained their best attachments.

Brocklesby, probably an Irishman, was born in the county of Somerset, in England, at a place named Minehead, and in that way, I should think, formed a matrimonial connection which afterwards

caused him to be related to Young, of whom, as his nephew, he was very proud at a very early date.

To Burke, Young seems to have been specially introduced, with particular mention of the studies he had undertaken in the Greek tongue; and in 1790, we find him following the lectures of Dr. Higgins on Chemistry, under Brocklesby's directions; while Mr. Wyndham, a fellow-friend both of Brocklesby and Burke, said of him, "that, whatever he determined on, he did." He had himself little faith in any particular aptitude implanted in him, by nature, for any given pursuit. His favourite maxim was that whatever one man had done another might do; that the original difference between human intellects was much less than it was generally supposed to be; that strenuous and persevering attention would accomplish almost anything; and, in the confidence of youth, and consciousness of his own powers, he considered that nothing that had been compassed by others was beyond his reach to achieve; nor was there anything which he thought worthy to be attempted which he was not resolved to master.

Dr. Brocklesby lived in Norfolk Street, Strand, and here it is possible that Young passed a considerable part of his time, especially when his career in medicine was fixed, and he had left, as was now the case, his country residence in Hertfordshire with the Barclay family. Brocklesby was bordering on seventy, and Young, still early in life, pursued, systematically, his medical studies. He took up the anatomical lectures of Baillie and Cruikshank with the demonstrations rendered by Wilson; he attended the surgery of John Hunter; the practice of physic of Sir Alexander Crichton; the midwifery of Drs. Clarke and Osborne; the botany of Sir J. W. Smith—whose widow, at a very old age, recently died; the medicine, or practical physic, of Dr. John Latham, physician to the Middlesex Hospital, from 1789 to 1793.

In all his lectures Young seems to have taken most careful notes, and in his anatomical readings he followed the great work of Winslow. Pettigrew tells us that on the day upon which Hunter died, 1793, Young wrote the following passage:—

"Hei mihi! quantum Praesidium
Ausonia, et quantum tu perdis Iule!"

Having finished the usual course of study common to the London student in the latter part of last century, Young returned for a time to his native county, and, notwithstanding many solicitations from

distinguished men in favour of other courses, he remained true to physic. The Duke of Richmond, who was then Master-General of the Ordnance, wished him to take the post of his assistant secretary, a favour which the Duke probably asked through Dr. Brocklesby, or through Charles Duke, of Richmond, a Doctor of Medicine of Cambridge, and a Fellow of the Royal College of Physicians from 1729 to 1750. Other friends, including Mr. Burke and Mr. Wyndham, would have had him proceed to Cambridge and become a student of the Law, but to no purpose.

In 1793 Young forwarded to the Royal Society, through Dr. Brocklesby, a paper entitled *Observations on Vision*, which seems to have attracted considerable attention; for, in the following year, he was raised to the Fellowship of the Royal Society, and afterwards proceeded to Edinburgh, at that time the famous school of medicine of the land. He took there the courses of Black and Monro, then amongst the most celebrated teachers of the world, the life of one of whom, Black, has already appeared in these pages; and, when these courses were over, he set out for Göttingen, the home and university of which seems to have been to him a scene of continued delight and satisfaction. He graduated at Göttingen in 1795 as a Doctor of Medicine, electing for his competitive essay *De Corporis Humani Viribus Conservatricibus*: he also delivered a lecture on the formation of the human voice. A letter by Young addressed to his mother, from this place, gives us a good deal of the life which he had now passed. The letter, which bears date November 22nd, 1795, tells the mother how he settled in Göttingen, and how much he likes the university. He has not, he says, a great deal of society to amuse or to interrupt him, and there are only three English students as his colleagues, two of them diligent and attentive, the other a man of fortune, and more dissipated; they were well acquainted, but did not wish to be much together, and engaged themselves, under a penalty of a forfeiture, never to speak English to each other after the first month. He began his work at eight in the morning with lectures on history, then followed others on medicine, and natural history. He had two good rooms in the pleasantest part of the town, in a house which Professor Arnemann let out to students, a man and his wife living in the house to wait on them all. He breakfasted in his own room; dined at an ordinary, composed chiefly of students, at midday, and in the evening ate an egg alone. In another letter, on April 24th in the following year, Young tells his mother that he is within a hundred yards of the

second library in Europe, and can have any book he wishes to consult. He desired to graduate at Göttingen, but not liking, rashly, to give up the privilege of a member of the Society of Friends, asked and obtained leave to be admitted without oath, a case which was then perfectly new. In July of the same year he reports the fact of his graduation; says there was no difficulty with respect to the oath, and that the whole time passed away very lightly, and with as much credit as he could possibly wish for. He would only remain a few days in the university, and would like to have a letter sent to him to arrive in about two months in Dresden.

He visited Dresden after his graduation, proceeded to Berlin, and, upon mastering the German language, came back to London for a time, and then visited Cambridge, where, as a fellow-commoner at Emmanuel College, he remained three years in pursuit of his studies. He graduated as a Doctor of Medicine of Cambridge, and, in the strict order in vogue at the period, was quite fitted to commence the practice of medicine as a physician, and to be elected first as a Licentiate, and, in due course, a Fellow, of the Royal College of Physicians, to which latter honour he was raised in 1808.

While he was at Cambridge Young became practically independent, for the famous Dr. Brocklesby died in London at a full age, and left to his nephew not only his fortune, but also his library and a considerable amount of reputation. Young entered the Metropolis with a good start, to use a common phrase, and, to some extent, there is no doubt, endeavoured to obtain medical practice, for he took a house in Welbeck Street, which was then a common centre for medical men of eminence, and which from the period of the Gordon Riots had been considered one of the best of the West End localities. He could not, however, have settled very seriously, for in the year that he came to London, 1802, he travelled with the Duke of Richmond and Lord George Lennox to France, and resided with them for a time at Rouen, after which he went, probably with them, to Paris, where he also, for a time, resided, and evidently mixed with the very best scholars of that country, and perhaps formed the friendship of M. Arago, although at that moment Arago, born as late as 1786, must have been a youth training for fame. It would appear that the life in Paris was to Young a very great pleasure; Paris was a seat of study, and, as may well be conceived, a centre in which he met and learned at the Institute many advanced and useful things, although it cannot be said that at the time mentioned France was in a state of peace or in great friendship with England, for the Battle of

the Nile had been fought and Trafalgar was not far off. Napoleon also was becoming the first name in France, for he was elected Consul for life in 1802, and, although he made overtures to England which many considered friendly in their nature, he was not particularly inspired by English politics. Whether Young returned to London from Paris during this time has been a question which certainly has its affirmative side, for he was elected about this time Professor of Experimental Philosophy in the Royal Institution of Great Britain, and became established as a lecturer there. Certain it is that he was back in London in 1804, as in that year the Royal Society conferred upon him the office of foreign secretary. In that same year he fell in love with Miss Eliza Maxwell, who, to his great satisfaction, became his wife.

A lecturer in the Royal Institution in the beginning of the century was not likely to have been a successful practitioner of medicine. It has never been the fact that any such man, however skilled in the art of physic, could become a popular physician. The world never likes a scientific doctor; and Harvey himself, although he discovered, or rather made clear, the circulation of the blood and the motion of the heart and blood, was one of the last who would be consulted practically, either on the heart or the blood, since he was of little moment—nay, even a matter of doubt and wonder—to his less learned brethren. Young was no exception; he was a man of knowledge and science, which was quite enough for his discomfiture in practice, if he ever felt it. Still, he endeavoured to practise, and at the same time delivered his discourses, as Sir Humphry Davy did, and the other of his compeers. He continued to do so until a little time after his marriage, publishing finally, in two quarto volumes, the subject-matter on which he had extended his experimental gifts and his verbal illustrations.

I have conversed with those who have seen Dr. Young and who knew his qualities. Dr. Roget was one who had seen him, and who, at dinner at the late Sir Thomas Watson's—where at various times in my early life I met several of the older men—gave me charming descriptions of him. Dr. Tweedie recollected him; so did Dr. Billing. Dr. Robert Willis held him in his remembrance. The late George Cruikshank, a layman and artist, had met Young, had once conversed with him by accident, and was surprised to hear that he had "sloped away" so quietly. Pettigrew, who was the friend of George Cruikshank, wrote the life of Young—and, indeed, wrote it so well that it is impossible to refer to the memoir

without finding an unmistakable picture. Dr. John Davy told me he kept him as closely in mind as he did his own brother, Humphry. All joined in the same testimony. They stated that Young was a good-looking and good-natured man; that he was exceedingly accomplished, quite an addition to the social table, refined in manner, although, like all Quakers, a little reserved; that he was in his early days an active pedestrian and horseman, but seemed to imagine that every other person was as learned as himself, which often made his mode of expression obscure; that he cared very little about the world's opinion of him as a physician, had not an exalted idea of medicine generally, and, being placed in easy circumstances, never ran after practice, and never sought the bubble reputation at the cannon's mouth. Sometimes he smiled quite incredulously at "skill," as it was called, and quoted Ecclesiastes, without being pessimistic in his tendencies.

After his marriage with Miss Maxwell, Dr. Young continued to live in Welbeck Street, giving up, in a short time, his position of lecturer to the Royal Institution, but publishing the lectures he had delivered there in the quarto volumes already named as *A Course of Lectures on Natural Philosophy and the Mechanical Arts*—volumes admired by many, and followed by some, although never remarkably popular. They might, indeed, be studied even in this day with very considerable benefit. I do not agree that these volumes are either fanciful or abstruse; Young was far too solid a man ever to have possessed a fanciful nature. He was not a man who was in any way abstruse by intention; he saw for himself what was perfectly clear before him, and he wrote in that spirit, however difficult it may have been to have followed him as a lecturer. In point of fact, he was in advance of his time. His days were of the romping period heralding the Regency, and were very much influenced by the crude ideas and by the fashionable converse of the day, to say nothing of its acts. It was not very likely, therefore, that his solid discourse should enter deeply into the public mind. Moreover, in the Royal Institution itself, other subjects than his own had gained prominent position, the works of Davy having, as far as they could, carried all before them. Still, the volumes remain, and it might be the labour of some man who is not too busy to republish them with due comments, connecting them with the labour and thoughts that are now current discourse.

There can be no doubt that at this time Young continued to practise, occupied with some morning practice, and with a certain,

though small, measure of physician's consultation, for in 1810 he was elected one of the physicians to St. George's Hospital. There he must have taught the younger minds, and carried on a rather extensive clinical labour for part of the year at least. It is not evident, however, that he made any great mark in St. George's, as John Hunter did before him, or Sir Benjamin Brodie later on. I made, many years ago, some inquiry on this matter, and do not find that he was ever a leading man in the Hospital, which did not for many years after him possess an independent school. The late Mr. Samuel Lane, who founded the school entitled the St. George's School of Medicine, and whom I knew, was not himself an official of St. George's Hospital, but continued to teach in the special school to which he belonged, and which became very useful to St. George's Hospital for many years. Mr. Lane, who finally went to St. Mary's Hospital on its foundation, related to me that he very well remembered Dr. Young, but that he always regarded him rather as a philosopher than as a physician; he recognised him as a man of the highest talent and reputation. Thomas Pettigrew, whom I knew, and his son, Vesalius Pettigrew, once a colleague of mine, also remembered Young; and Vesalius, conversant with his own father's ideas respecting him, sounded the admiring tone whenever he spoke of him.

This is what I have been able to gather about Dr. Young's London life; but my friend, Dr. Haward, reminds me of the portrait of him by T. Brigstock, copied from Lawrence, that is now in St. George's Hospital, where Young remained a physician until 1829.

It is interesting at the same time to know, that during the period in which he practised in London, Young became also a resident, at intervals, of the town of Worthing. It is probable that he did not find London air and life altogether suitable to him; for, although he seems to have been a moderately strong man in his youth, he did not retain his strength fully, but was affected occasionally with what was said to be an asthmatic tendency; thereupon, he divided his seasons between London and Worthing, spending the winter part in London and the summer part at the seaside.

At the time when Young began to take up his residence in Worthing, that town was beginning to take the first place amongst certain of the West-End inhabitants of London. Worthing rose into fame soon after Brighton, which had become distinguished as a watering place through the labours of Dr. Russell. About 1804 Mr. James Evans, M.A., began to live at Worthing, and published

a book entitled *A Lecture on Worthing and the Adjacent Villages, with the Tides, and with the Excursions in the Vicinity*. Very little public notice had been taken of this seaside resort in Sussex. Indeed, the village, as it might then be called, was in the parish of Broadwater near by, and the inhabitants of the place were mainly occupied with agriculture and such-like industries. Evans, who seems to have had a town house in Islington in what was called Pullin's Row, was the first writer who made any mention of the place. He was very particular in describing the journey from London. The course seems to have been through Southwark, Battersea, and Clapham, through Upper and Lower Tooting, and Merton—where once stood an old and famous abbey, and where there had been a seat which Lord Nelson had occupied—Morden, Ewell, Epsom, Ashstead, Leatherhead, Mickleham, Dorking, Horsham, by Great Winstead, on to Findon, Broadwater, and, finally, Worthing. Of course, in this pilgrimage, coaches, at the period named, were the only methods of transit; yet the route was very entertaining, from the number of historical events that occurred on it. As Evans says, the road from London exhibited all along, on each side of it, the ever-varying and irresistibly attractive beauties of Surrey and Sussex. In the summer season the journey of eight hours was pleasant and never fatiguing, presenting to the eye the charms of a well-cultivated country. The town of Worthing itself was not then very brilliant; the huts had been pulled down which the fishermen had held, decent houses began to be scattered about; and it is most probable that Young lived in one of these, and perhaps possessed it. A map at this moment lies before me showing how the town was then laid out. It consisted of several streets, a theatre, and some rows of rather elegant dwellings. The accommodation seems also to have been very favourable: Warwick House, opposite the Colonnade Library, was considered as rather a conspicuous marine residence; and the town had the advantage of affording many houses of various sizes for the families of persons of good standing who resided in the Metropolis during the greater part of the year. Schools also began to rise in this locality. Young was certainly there in the year 1813, and probably shared in some measure, in 1814, in a kind of demonstration, which took place owing to King Louis XVIII. having sent to the town, through the Archbishop Duke of Rheims, a letter returning his thanks for their congratulations on his ascent of the French throne; but it is not clear that Young made himself in any way conspicuous as a resident of the place, for conspicuousness was

not his tendency. He was much absorbed in his natural history pursuits, and he cared very little for what was going on around him, though he was certainly favoured by the climate and the surroundings. He found a good beach, agreeable baths, and a fine vegetation, myrtle-trees in abundance growing in the open air, and reaching sometimes to twenty feet in height, fig-trees in luxuriance, a very fine sea, and pleasant walks. He also found an acceptable company, probably some members of the royal family, and a great many of the better class of the land. In short, he enjoyed this place as a resting-place, and sometimes used it as a centre in which his literary work could be systematically pursued.

I have endeavoured industriously at Worthing—and Mr. C. F. Williams, who resides near Worthing, has done his utmost in helping me—to find out where it was that Young resided during the summer months, and how many years he remained there. These facts are all gone ; but it appears that he returned to London about 1823, and resided in a house which he had built for himself in Park Square. This must have been in Regent's Park, a spot, at the time named, becoming famous, and where many distinguished persons were pleased to retire. The Park itself was in process of ornamentation, with the promise of a Zoological Garden, a promise which very soon became fulfilled, under the guidance of Mr. Raffles, an active and useful naturalist.

Young resided in Park Square to the end of his life, following out his work in various directions, but specially in the Royal Society and the British Museum. He did not, however, confine himself entirely to England, for in the year 1817 we find him in Paris as a distinguished Englishman, the friend of Arago (now a recognised master in science), Cuvier, Humboldt, and others of that type. In England he became a commissioner under the Privy Seal, in conjunction with Dr. Wollaston, Dr. Charles Gilbert, Sir George Clark, and Sir Joseph Banks, in order to investigate the state of weights and measures throughout Great Britain. To this Commission he acted as secretary. He was also appointed by the Board of Admiralty to conduct the calculations for the Nautical Almanack, a task which he continued until the end of his days.

Such, in general outline, is the course which Dr. Young seems to have pursued. It is clear that he never attempted to be a fashionable physician, and, in fact, rather despised such a position than otherwise. His mind was turned towards natural science, and, although he cannot be said to have been devoted to his profession, he certainly

considered it a noble profession, was attracted to it, and gave to it, when it was before him, the fullest and happiest consideration. He gained few distinctions, except those which came from scientific distinction, in this country, but he became a member of the most distinguished circles of France; and, in many respects, he was the leader in scientific works afterwards carried out by other men, by rendering such work accessible to, and understandable by, the public at large. I cannot trace that he was ever appreciated in his profession by the members of royal or noble families, nor were the practitioners who were accustomed to attend those families solicitous as to his opinion in any medical case; and some think that he cared nothing for the neglect, and was rather glad not to have any tax upon his time, intellect, and investigation, that might lessen his success and future fame.

Let us now briefly consider the bases on which his fame rests; that is to say, the demonstrations and theories he proposed, and the books he left behind him for our education.

THE PAPERS AND WORKS OF YOUNG—THE MEDICAL.

The works of Dr. Young may be divided into two classes—those which are medical or physiological, and those which are philosophical. It need not be denied that the philosophical essays held the first place, and that in the medical he did not, from some cause or other—perhaps from want of time—compose or write so as to be distinguished as a practitioner as well as a philosopher. We will, however, take certain reviews of the medical works first, and then touch briefly on the philosophical.

Climate.

The first subject to which attention is thus drawn in the works of Young is an essay on the medical facts of climate. This essay includes a large amount of information, and was written about the year 1813. There are many parts of the work which seem to have formed an introduction to a time of medical literature that might be usefully transcribed. I must be content to take only a few parts. He considers that a complete system of meteorology, so far as the properties of climates with regard to temperature may be concerned, would represent almost as great difficulties as the complete theories of the nature and cure of disease. The simple indications of a thermometer, however accurately they may be observed, by no means

award a correct temperature as it affects the human system ; nor is it possible to express the modifications produced by wind and moisture, even supposing them to be easily known. He had known a temperature of 65° , with a thick fog and very little wind from the north-east, appear to a person taking moderate exercise most oppressively sultry ; although a person sitting long still might have felt the same air uncomfortably cold. Moisture must make both hot and cold more sensible ; the one by diminishing respiration, the other by increasing the conducting power of the air.

Of the empirical evidence which may be collected respecting the medical effects of different climates, the most authentic, he says, "is perhaps that which is derived from well-regulated bills of mortality ; since these documents ought to afford us a tolerable criterion of the general healthiness or unhealthiness of a place, from the proportion between the annual deaths and the population, and they ought also to afford a pretty correct determination of the degrees in which different diseases are fatal. Thus, when we find that in Stockholm the annual deaths amounted to $\frac{1}{15}$ of the population, in London to $\frac{1}{21}$, in the Pays de Vaud to $\frac{1}{33}$, and in some villages in different parts of Great Britain to $\frac{1}{60}$ only, we cannot hesitate to consider a residence in the country as generally more healthy than in a metropolis similar to either of those cities ; although it cannot fairly be concluded that the healthiness is precisely in the proportion which might be inferred from this comparison, until we have considered how far the effect of emigration to a great town may influence the apparent mortality. After the age of eight or ten, the probable duration of life may be estimated with sufficient accuracy, as Demoivre has very ingeniously shown, by assuming that, of a certain number of persons born together, one will die annually until the whole number has become extinct ; and it is well known that this number may in common cases be supposed to be eighty-six ; so that at any given age, for instance thirty-six, we may find the probable duration of life by deducting it from eighty-six and halving the remainder, which will give us twenty-five for the estimate required. And if this law were universally true from the time of birth, it is easy to show that the mortality in a metropolis would always be increased by the accession of settlers ; so that if, for example, the whole population were supplied by settlers at twenty, and all children were sent to a neighbouring village to be educated, the mortality of the town, instead of $\frac{1}{33}$, would become $1 : (43 - 10) = \frac{1}{33}$, and that of the village would be $1 : (86 - 10) = \frac{1}{78}$; and that any partial

changes of a similar nature would cause a smaller alteration of the apparent salubrity, in proportion to their extent. But the mortality during infancy is actually much greater than is assumed in the simple hypothesis of Demoivre ; and from this circumstance, as well as from the frequent return of aged persons into the country, Dr. Price has inferred that emigration in general has no tendency to increase the mortality of cities. In reality, the question depends altogether upon the mortality which may be supposed to take place within the first year, which is often estimated at one-third of the births ; but nothing like this can well be expected to occur at any tolerably healthy place in the country ; and, on the whole, it does not appear that Dr. Price's observations can by any means be admitted as conclusive. With respect to the evidence afforded by the prevalence of diseases, it has been observed by Dr. Gregory that removing from a colder to a warmer climate may be beneficial, even in those diseases to which the inhabitants of the warmer climate are subject ; but if they appeared to be equally or more subject to any disease than the inhabitants of the colder, there would surely be little encouragement for the change : for instance, if a person were supposed to be liable to diseases of the liver, it would surely be injudicious to undertake a voyage to a hot climate, with a view of avoiding the chance of taking cold, since the well-known frequency of hepatitis, in such climates, would much more than counterbalance any prospect of advantage from the change."

Medical Literature and Nosology.

In this same year, 1813, Dr. Young prepared a medical book entitled *Medical Literature and Practical Nosology*, in which he wrote an introduction to medical literature, including a system of practical nosology. The work created a considerable sensation, and must, I think, have had a wider circulation than we now conceive. It certainly was a bold effort, and conveys, either intentionally or accidentally, that he had a large store of information both for hospital and private practice. In this work he fell a little across Cullen's *System of Nosology*, for which he almost necessarily received the severe criticism of the Edinburgh Schools, with the result of a sharp review from the *Edinburgh Medical and Surgical Journal*. It was considered, in this review, that he had been hasty in the manner in which he had set aside what was, at that time, considered the pure orthodox physic ; and I have before me, at this moment, a letter of his in reply, not wanting in sharp retort. He corrects several errors ;

relates a conversation he held with the famous Dr. Willan on the subject of skin disease ; touches on Sir Alexander Crichton, and defends the use he made of the term *acology* instead of *therapeutics*, *acology* meaning, by him, the separate consideration of the operation of particular remedies. The essay was probably written at Worthing, and bears date October 21st, 1813. To the same work Young attached essays on chemical affinity, the study of physic, classification, animal chemistry, on climates, and on the blood. The papers were altogether remarkable in many passages, as where he says that "there is no study more difficult than that of physic, since it exceeds as a science the comprehension of the human mind." In the work on the blood he described an instrument he had invented, which he called an *Eriometer*, for making exact measurements of the blood corpuscles, the first, it would seem, of its kind, as Dr. Gower's is the last.

Essay on Consumption.

Dr. Young was famous for an essay on consumption, which became of interest. At the period the stethoscope had not been discovered, although it was discovered before he died, and, therefore, it is necessary to take, *cum grano*, certain of the conclusions to which he was led. At the same time he deserves a certain very distinct measure of credit, as well as occasional admission of errors. Thus he supposed that the frequency of consumption was decidedly greater in cold than in hot climates, but not in exact proportion to the depression of mean temperatures. The whole subject is very curious. He was of opinion that in the West Indies both scrofula and consumption were uncommon, but that the inhabitants of the West Indies coming into a colder climate were peculiarly liable to attacks of these diseases ; he urged that Bermuda and the more sheltered parts of Jamaica might be extremely favourable to the inhabitants of this country who were subject to consumptive affections.

On Vision and the Mechanism of the Eye.

Through all the life of this author we find that he was a close student of vision and of the eye, his lectures and papers on these subjects partaking of a mixture of physiology, practice, and philosophy. An early paper bears on the topics named, and in one of his earliest lectures, delivered in the first year of the century, as a Bakerian Lecture, he enters largely into the dimensions and refractive qualities

of the eye, and the size of the pictures which are developed on the retina. He considered that the lens was specially adapted to the character of the image that should be placed on the retina, and discussed, what had previously been considered by John Hunter, the capacity of the lens for movement, so that the distance of objects was, as it were, regulated by a muscular movement of the lens, which was under the control of the mind. He supported this view by the statement that in persons operated upon for cataract, though the lens is absent, the focal distance is always the same.

PHILOSOPHICAL WORKS.

The observations and speculations of Young, which were of a philosophical order, are so numerous that I must not venture to treat of them at any length. We must admit that in these observations are embodied the noblest and purest part of his labours. There can be no doubt that he was really one of the greatest observers on these subjects, and when we take up the theory of light together with his idea of the wave motion of light and of the luminiferous sea, if I may so call it, which extends through all the universe, binding one sun with another, suns with planets, and planets with their satellites, we have a lesson before us such as no one conceived so clearly as himself, or described so splendidly. Let the following short passage from his own words express something of what he conceived :—

“It was in May 1801 that I discovered, by reflecting on the beautiful experiments of Newton, a law which appears to me to account for a greater variety of interesting phenomena than any other optical principle that has yet been made known. I shall endeavour to explain this law by a comparison.

“Suppose an equal number of waves of water to move upon the surface of a stagnant lake, with a certain constant velocity, and to enter a narrow channel leading out of the lake. Suppose then another similar cause to have excited another equal series of waves, which arrive at the same channel, with the same velocity, and at the same time with the first. Neither series of waves will destroy the other, but their effects will be combined; if they enter the channel in such a manner that the elevations of one series coincide with those of the other, they must together produce a series of greater joint elevations; but if the elevations of one series are so situated as to correspond to the depressions of the other, they must exactly fill up those depressions, and the surface of the water must remain

smooth ; at least, I can discover no alternative, either from theory or from experiment.

“Now, I maintain that similar effects take place whenever two portions of light are thus mixed ; and this I call the general law of the interference of light. I have shown that this law agrees, most accurately, with the measures recorded in Newton’s *Optics*, relative to the colours of transparent substances, observed under circumstances which had never before been subjected to calculation, and with a great diversity of other experiments never before explained. This, I assert, is a most powerful argument in favour of the theory which I had before revived : there was nothing that could have led to it in any author with whom I am acquainted, except some imperfect hints in those inexhaustible but neglected mines of nascent inventions, the works of the great Dr. Robert Hooke, which had never occurred to me at the time that I discovered the law ; and except the Newtonian explanation of the combinations of tides in the port of Batsha.”

I must not wait to observe on the various criticisms which have been made on this theory of Young in regard to interference of light. The chief point of it was that radiant light consists of undulations of the luminiferous ether ; and, as Mr. Pettigrew tells us, M. Arago regarded this as Young’s greatest discovery.

Reading of Egyptian Hieroglyphics.

Whether this reading was the greatest discovery of Young or not, reference must necessarily be made to the part he took in the matter of Egyptian hieroglyphics. By most persons he is considered to have been the first man who discovered the way to read the hieroglyphics on the Rosetta stone, still kept in the British Museum.

The fate of this stone is very curious. It was first obtained by the French during their occupation of Egypt, Napoleon himself taking the greatest interest in the discovery. While some French troops occupied Rosetta, a few workmen, digging for the formation of Fort St. Julian, disinterred a huge pillar of black basalt on which were exhibited the remains of three distinct inscriptions. This monument then fell into Dutch hands, and was at last with other trophies brought to England. It caused here the greatest interest ; and the last lines of the inscription told in Greek that the whole had been inscribed in three different characters, the sacred or hieroglyphic, the enchorial or letters of the country, and the Greek, all in honour of Ptolemy

Epiphanes. Thus there was found a hieroglyphic with an express translation. In 1814, Young commenced his researches on the stone, and deciphered the enigma.

It is supposed that Young's reading gave the key to the lost literature of Egypt, but it has been assumed also that Champollion, of Grenoble, a cotemporary, thirteen years younger than he, has the right to be considered the equal, and in some sense, the earlier philosopher. Apart from controversy there cannot be a doubt that the learning of Young, more than anything else, led to the various discoveries in Egyptian literature which have since followed.

The many other works to which the name of Dr. Young has been attached are quite remarkable, and the reader who is interested in them must turn to the late Mr. Pettigrew's excellent memoir, where he will find them all very carefully laid out. He should also study the same author's work on *Mummies* to learn specially the Egyptian part of the great Englishman's labours. The medical reader, too, will find considerable interest in Young's essays on the *Cohesion of Fluids*, on *Shapes affected by Friction*; on the *Function of the Heart and Arteries*—a Croonian Lecture in which it is advanced that the larger arteries do not propel the blood, but act as passive tubes through which the blood passes by the motion of the heart—and many others.

CONCLUSION.

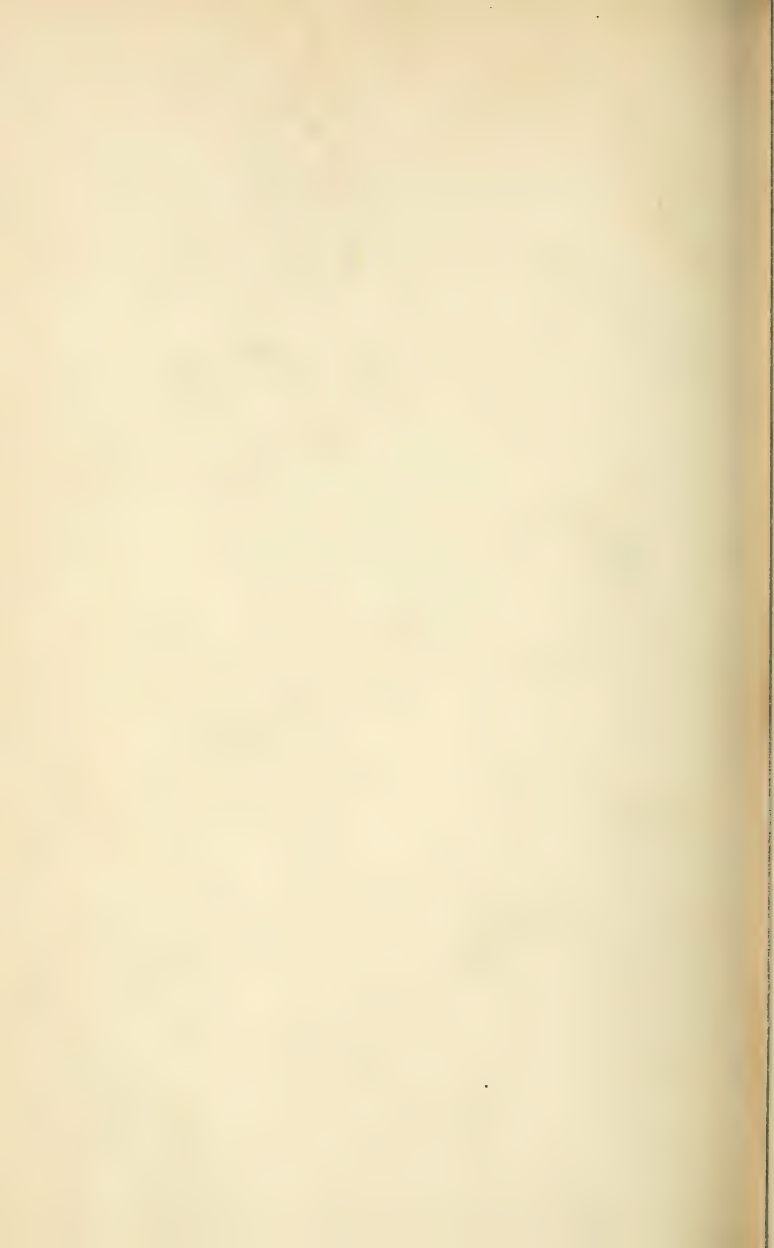
We have followed our illustrious brother now from the beginning to the close of his career. He was not an old man when he died, for he had only entered his fifty-sixth year when his life began to fail. In ordinary life he may be considered a fairly successful man, blessed with every means necessary for his support; childless, but the companion of an accomplished wife, and surrounded by distinguished friends, foreign as well as English. His connection with the Government was most satisfactory until his later days. He was conductor of the *Nautical Almanack* and, as a member of the Board of Longitude, he was connected with Professor Faraday, and with Captain, afterwards Sir, Edward Sabine, who became President of the Royal Society. He was, in 1827, elected one of the eight foreign members of the then Royal Institute of France.

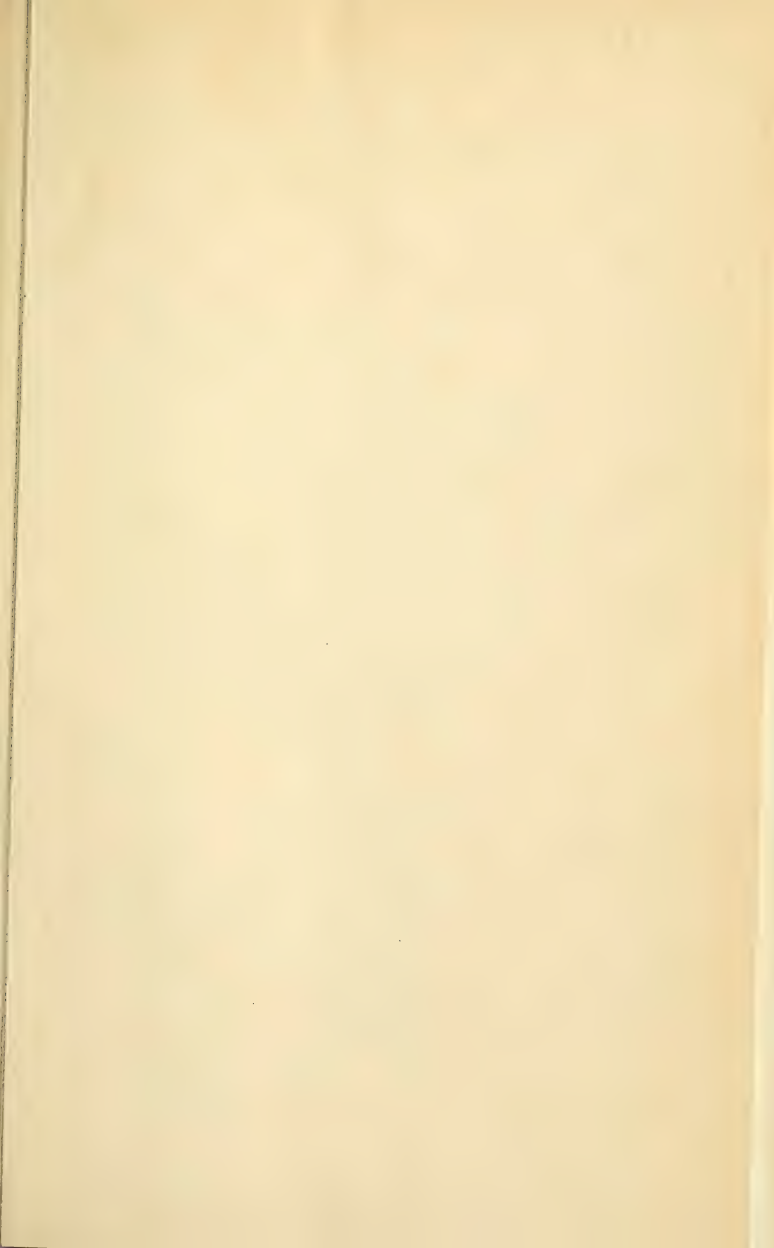
Young seems to have been in fair health until 1828, when his powers began to decrease, with breathlessness, whenever he made ascents. He was subject this year to some little mental annoyance, which was not, however, sufficient to account for the symptoms.

Slowly he became much affected, and was under the care of Dr. Chambers, whom some of us remember, and of Dr. Nevinson. Although much annoyed by certain attacks that had been made upon him from the outside world, he was exceedingly composed, accepted the danger of his situation, continued his work, and at the church which he attended took the sacrament. He was of opinion that he had exerted his faculties through life as far as they were capable of exertion, but that for eight years previously he had been more careful of training them without injury; and he settled up all his affairs, so that if he recovered somewhat he could pay more attention to scientific work. Unfortunately his illness continued steadily, and he felt himself gradually sinking, till the month of May, on the tenth day of which month he expired without a struggle, just before completing his fifty-sixth year. "The disease," says an informant, whose name is not given—probably Dr. Chambers—"consisted of ossification of the aorta," which must, he thought, have been in progress for many years, although constitutional formation and unwearied labour of the mind from the earliest days of infancy led, probably, to the development of premature age.

Young was buried in the vault of his wife's family in the church of Farnborough, in Kent, where there is a monument to him. There is also a medallion to him in Westminster Abbey. The portrait by Sir Thomas Lawrence which faces the first page of this biography was faithfully copied for Pettigrew, was published by him, and gives, I am assured, a faithful picture.

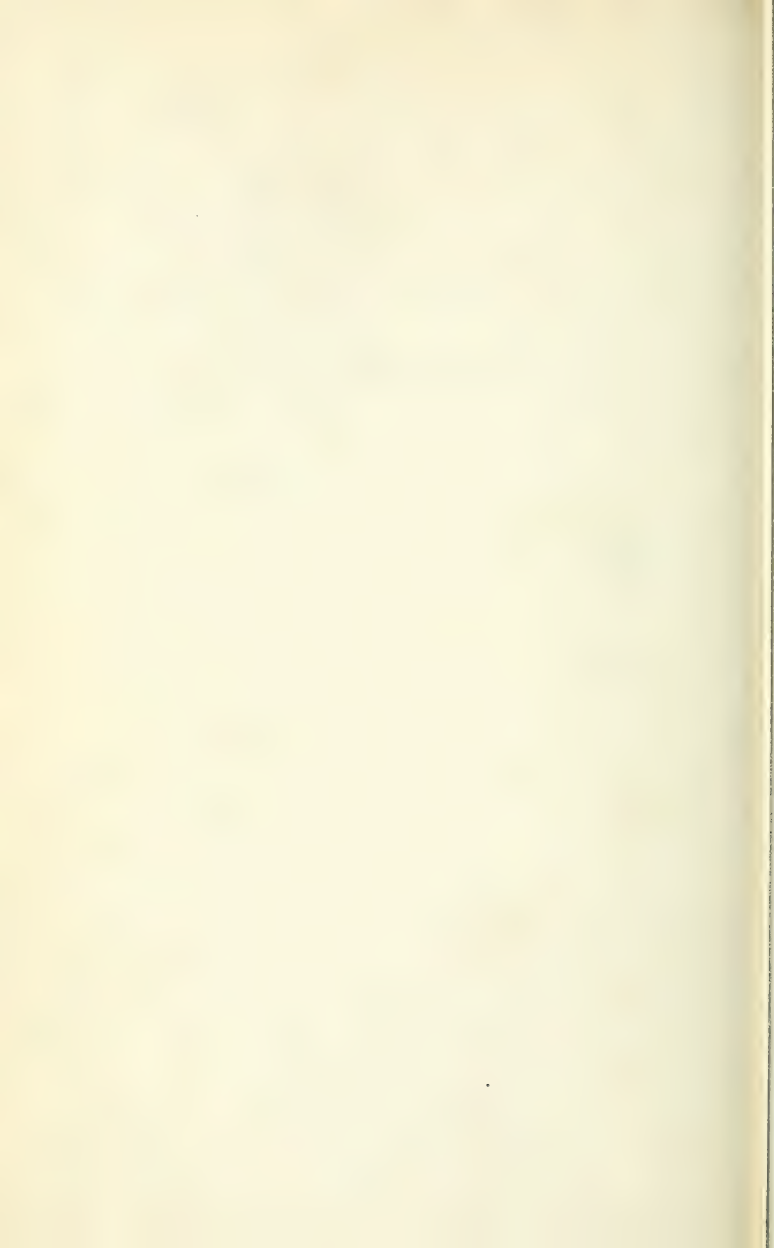
THE END.













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